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Mining and Other Pumps.

THE accompanying engraving illustrates two steam pumps made by GUILD & GARRISON, Nos. 26, 28 and 30 First street, Williamsbu gh, L. I. FIG. 1 is a double-acting plunge pump, which has been in successful operation for the past nine years for mining purposes, so that, of course, its reputation is pretty well established, as shown by the fact that the St. Louis waterworks are now using twelve of them to supply the city with water. The largest of these has a steam cylinder 18x24 inches. As will be seen from the engraving, (FIG. 1,) the steam cylinder to the left is provided with an ordinary steam chest. The operation of the slide-valve is also clearly shown. On the right are the two pumping cylinders, having a common air-chamber. The circular box shown just below the air-chamber contains the valves for both cylinders. They start from any point as soon as steam is applied, and run smoothly. The plunger is so constructed that it can with little difficulty be kept always tight. The valves can be easily reached by simply unscrewing the front plate, shown in the engraving.

FIG. 2 represents what is known as the Improved Union Steam Pump, which differs from the double-acting pump, mainly in having but one pumping cylinder, provided with a piston instead of a plunger. They are made of different sizes, from No. 1 to No. 18. No. 12, for example, has a steam cylinder 15 inches in diameter, a pumping cylinder 14 inches in diameter, and a capacity of 933 gallons per minute. It costs one thousand dollars. The smallest size has a capacity of twelve gallons per minute, and costs only one hundred dollars.

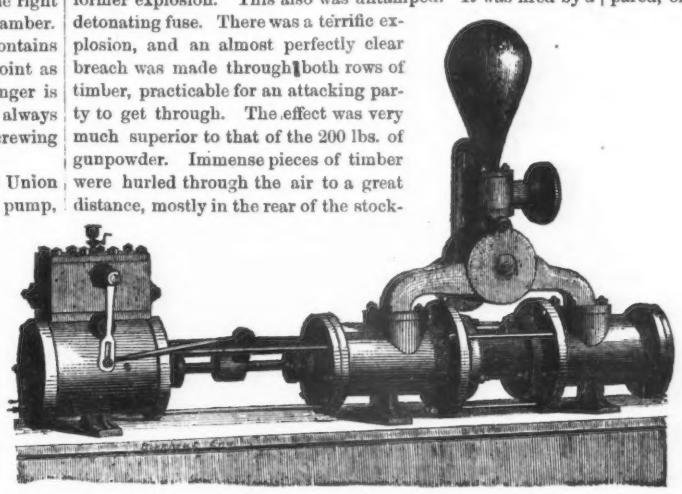


FIG. 1.—DOUBLE-ACTING PLUNGER PUMP.

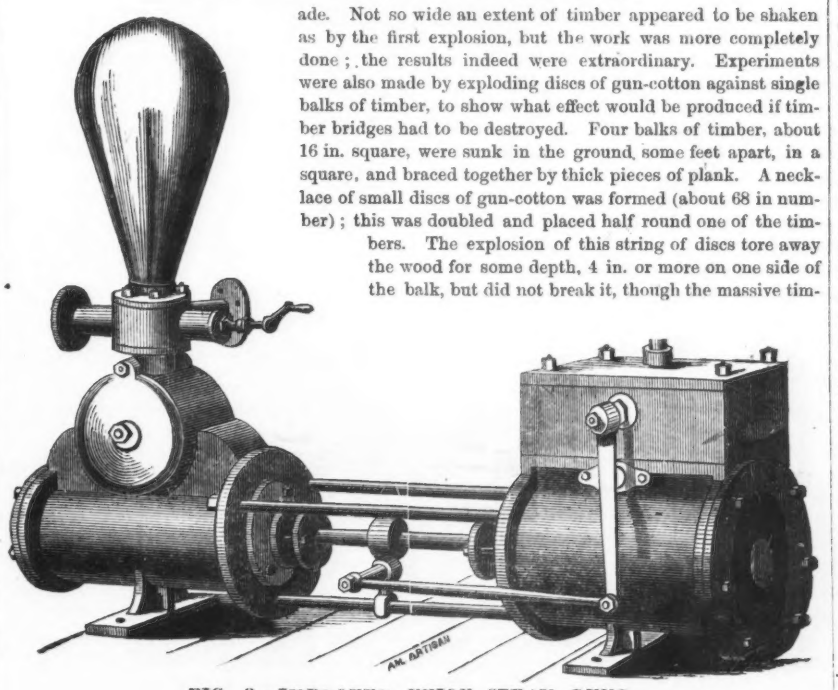


FIG. 2.—IMPROVED UNION STEAM PUMP.

Prevention of Sea Sickness.

WE stated a short time since that the plan patented by Mr. BESSEMER for preventing sea sickness, by constructing a chamber for passengers on board steamers, suspended on the same principle as the compass, was about to be practically tested, and that Messrs. MAUDLAY were constructing a screw steamer of three hundred tons burden upon the principle. We understand that the steamer will be ready for its trial trip in November next. Should the result equal the anticipations of its inventor, and of all who have seen the models and drawings, it must lead to the construction of similar ships capable of taking all the traffic between this country and Europe. Two of these, it is calculated, could be built for £130,000, of great size, fitted with the most luxurious accommodation, and of sufficient power to make the channel passage in sixty or seventy minutes. In the event of the process being found perfect, Mr. BESSEMER intends, we believe, to offer the use of it first to the various interests primarily concerned, such as the English continental railway lines, etc., and, failing any arrrngement with these, to organize a general system of international communication with independent capital. As respects the future prospects of the railroads in connection with Ireland on the one hand, or the Continent on the other, the importance of the approaching trial can hardly be overestimated.—*Railway News.*

Comparative Effects of Gunpowder and Gun-Cotton.

From the Mechanics' Magazine.

A NUMBER of experiments have been recently carried out by the officers of the Royal Engineers at Chatham, to test the comparative effects of gunpowder and gun-cotton in various operations. The experiments were all under the direction of Colonel W. O. LENNOX, C. B., V. C., Instructor in Field Fortifications at the School of Military Engineering, assisted by a number of other officers. The experiments were attended by a large muster of officers of the garrison, besides those of the Engineer Corps, and also by Major-General J. L. BROWNRIGG, C. B., the commandant of the garrison; Colonel WRAY, Colonel GRAHAM, C. B., V. C.; Colonel FISER, Colonel LOVELL, commanding Royal Engineers; Colonel the Hon. H. F. KEANE, Deputy Adjutant-General Royal Engineers; Colonel CLARKE, etc. Mr. F. A. ABEL, Chemist to the War Department, was also present and assisted in some of the experiments with gun-cotton. The experiments commenced with explosions of gunpo wder and gun-cotton directed against a double stockade of balks of timber, fourteen inches square, three feet six inches apart, and sunk three feet in the earth, each line braced together by strong cross pieces. A charge of two hundred pounds of gunpowder, in bags merely laid at the foot of the stockade, untamped, was first exploded. It forced a large gap in the front stockade, but, though partially shattered, the second row of timber would have presented a formidable obstacle to an attacking party if defended by a few resolute men. Portions of the timber were hurled through the air to some distance. A charge of eighty pounds of gun-cotton was next laid in bags at the foot of the stockade, some distance from the former explosion. This also was untamped. It was fired by a detonating fuse. There was a terrific explosion, and an almost perfectly clear breach was made through both rows of timber, practicable for an attacking party to get through. The effect was very much superior to that of the 200 lbs. of gunpowder. Immense pieces of timber were hurled through the air to a great distance, mostly in the rear of the stockade. Not so wide an extent of timber appeared to be shaken as by the first explosion, but the work was more completely done; the results indeed were extraordinary. Experiments were also made by exploding discs of gun-cotton against single balks of timber, to show what effect would be produced if timber bridges had to be destroyed. Four balks of timber, about 16 in. square, were sunk in the ground some feet apart, in a square, and braced together by thick pieces of plank. A necklace of small discs of gun-cotton was formed (about 68 in number); this was doubled and placed half round one of the timbers. The explosion of this string of discs tore away the wood for some depth, 4 in. or more on one side of the balk, but did not break it, though the massive timber was much rent. Three or four larger discs were then exploded on one side of the timber, and tore out a large portion of the wood. A single "necklace" of small discs, 65 in number, and weighing 2¼ lbs., was then placed round another balk, quite encircling it. When exploded, this tore out the wood all round to some depth. Then twelve of the larger discs, weighing 4 lbs. 2 oz., were hung on nails on three sides of the timber, and exploded. The explosion was very powerful, and the large balk was cut in two—snapped off where the gun-cotton had been attached, but falling on the side where there had been no discs, and partially splitting on that side. The spectators cheered at this decisive proof of the value of gun-cotton for this special purpose. All these experiments appeared to be very satisfactory. At that part of the lines in front of St. Mary's Barracks, a number of mines and galleries had been excavated and charged with gunpowder or gun-cotton. One mine had a charge of 500 pounds of gunpowder; a second similar mine was charged with 200 pounds of gun-cotton. Two smaller mines were charged respectively with 21.6 pounds of gunpowder and 8.6 pounds of gun-cotton. These mines were successively exploded by means of an electric current. In the larger mines the powder appeared to be the most effective agent. In the explosion of the 200 pounds charge of gun-cotton a peculiar effect was produced; first, there was the eruption of brown clay and smoke, and then a large flame, produced by the ignition of the gaseous products of the explosion. The officers then proceeded to the old engineer depot, near St. Mary's Convict Prison, and walls which are to be removed were experimented upon; they are eighteen inches thick; charges of gun-cotton ranging from two pounds to three and a half pounds were exploded against these walls, with satisfactory results, making breaches in them. The officers then returned to the scene of the mines, where two long galleries had been prepared, one charged with 240 pounds of gunpowder, the other with 96 pounds of gun-cotton. These charges were exploded. The object was to ascertain if it is practicable to form trenches in this manner, instead of throwing them up while exposed to the enemy. It was thought by some officers that the explosions would throw the earth up on either side in such a manner as to form a trench; but the result was not so; the earth was thrown up in a mass, and no trench was formed in which men could get under cover at once. The experiments created the greatest interest among those who witnessed them, and were highly satisfactory.

The Fair of the American Institute.

THIS fair, the opening of which was briefly noticed in the last number of the ENGINEERING AND MINING JOURNAL, now presents a more finished appearance than when we last alluded to it, and a number of articles of interest are now well exposed to view. The machinery department, however, is still in process of being fitted up, so that probably a week more will elapse before it will be in complete running order. At present the most striking object in this department is a hundred and twenty horse-power ALLEN engine, running at a very high speed, about one hundred and thirty strokes per minute. It has about thirty-six inches stroke, and a cylinder of about twenty-four inches diameter. The engine works smoothly and makes but little noise, though at the time of our last visit the work was still going on with the connections. The boiler and steam connections of this engine have been covered with a non-conducting felting, manufactured by the United States and Foreign SALAMANDER FELTING COMPANY, L. B. SQUIER & Co., No. 172 Front street, Agents. This felting is strongly recommended by those who have used it as being an excellent non-conductor; very desirable, and possessing sufficient elasticity for use on expansion joints. It is not applied in pieces like ordinary felting, but covers the entire surface to be protected without cracks or joints. It is very light, capable of withstanding any temperature at which steam is used, and is said never to give rise to any corrosion or rusting of the iron.

GREENE'S upright balance engine is also on exhibition, but was not in operation at the time of our visit, so that we reserve a description of it for another occasion. From a desire to do full justice to other machinery, we are compelled to reserve our verdict, as it is not yet in condition to be properly seen.

The department of photography, chromos, musical instruments, etc., attracts probably more attention at present than any other. Indeed the collection of photographs is one which any New Yorker may well be proud of and enjoy examining, as the best photographic artists of the city are represented. One of MATHEW'S largest soda-water fountains is placed in the centre of the main building, and forms an object of interest, especially to the thirsty. It is the largest and most elegant that we have ever seen. The quality of MATHEWS' soda is too well known to need comment. In the main building, near the machinery department and driven by steam-power, are a couple of large emery-wheels, made by a new process by the Union Stove Company of Boston. The process, which was fully explained by the treasurer of the company, Mr. JOHN F. WOOD, is known as the oxychloride of magnesia process. We shall probably give a full description of the process hereafter. On the whole the fair is quite interesting, but will probably show to much better advantage this week than it did last.

Nevada Silver Mines.

II.

EUREKA DISTRICT.

TO THE EDITOR: Sir—This district is situated in Lander county, Nevada, about forty miles west of Hamilton and sixty-five miles east of Austin, in a spur of the Diamond range of mountains. The prevailing rocks in the district are dolomitic limestones, quartzites, sandstones, slates, and occasionally these stratified rocks are capped by a coarse-grained, white, porphyritic tuffa. This district compares very favorably with most others in Nevada, in regard to the comparative abundance of wood, grass, and water.

The first silver mines were here discovered about five years ago. They lie in New York and Secret cañons, and occur in limestone. The ores in these are sulphates, antimoniates, and carbonates of lead, carrying from $20 to $200 silver per ton, and stetefeldtite, galena, and a mineral similar to bournonite. They are very quartzy, and the deposits are rather limited. There was never much importance attached to them, and with the exception of an attempt at smelting, which failed on account of the impossibility of sufficient concentration by hand, there was never anything done to beneficiate the ores.

A year ago, however, an entirely different class of deposits was discovered on Mineral Hill, two and a half miles south-west of the town of Eureka. These mines have secured the future of the district. They are the most extensive deposits of middling high-grade ores that I have met with in Nevada, and although carrying a high percentage of base metals, they are, nevertheless, the most valuable of any discovered during the last four or five years. At the locality where these deposits occur, the rock strata are highly inclined, and the ores occupy a zone running with the strike of the strata, and either at or very near to the contact line of limestone and quartzite beds. This zone has been followed for miles, and deposits of greater or less magnitude have been found everywhere. The quartzite is nearly always the foot wall of the deposits, while the limestone may be termed the hanging wall; sometimes, however, the ore lies entirely in the limestone a short distance above the quartzite. The Buckeye, Champion, Jackson, Sentinel, and Richmond, are at present the most important mines. On these the most work has been done, and huge deposits are fully exposed to view. The Buckeye and Champion, for instance, have been worked to a large extent as open quarries, and to prove the continuance of the ore in depth, two shafts have been sunk in the Buckeye, of respectively 75 and 65 feet in depth. The two are connected by a level, which passes on in opposite directions from both shafts for some distance, so as to make the whole length of the level 75 feet. In this level is a chamber 16 feet square, cut out in the ore, which does not touch the limits of the deposit on either side. A crescent at another place, 30 feet in length, has also failed to define the width. The Buckeye and Champion are close together, and are both owned by the same San Francisco company, which bought them, together with the Sentinel, another adjoining mine, from the original discoverers, for $100,000. It was an exceedingly low price, especially as there were some 2,000 tons of ore on the dump at the time of the purchase. This ore, in fact, is all that was paid for, as will appear from the assays to be given hereafter. From the Champion, ore has been taken from an open cut about 25 feet deep, 16 feet wide, and 25 feet long, and from a large chamber about 20 feet square, which is heavily timbered. The only outcrop of this tremendous deposit was a three-inch crack in the limestone filled with hydrated oxyde of iron. A blast put into the limestone threw off a thin cap of not more than six or eight inches, which covered the whole deposit, and which is again overlain in several places by earth from four to six feet deep. The ore is an earthy carbonate of lead, in which lumps of undecomposed galena are found. This galena is almost invariably covered with a thin crust of a product of the decomposition of galena and arsenical pyrites, which is probably analogous in composition with statefeldtite, and in which the antimoniates seem to be replaced by arseniates. This crust is much richer in silver and gold than the galena or carbonates. Mixed with the latter occurs considerable arseniate of iron, easily recognizable by its color and by blow-pipe tests.

The following averages of the assays of the ores smelted up to the end of April, comprising many thousand tons, will give an idea of the richness of these ores:

Champion....	$67 53	Au. and Ag. $75 70 per ton
Buckeye.....	75 75	" 83 60 "
Jackson.....	81 10	

The figures are taken from the assaying records of Messrs. JUNGZIOHN and HARTWIG, and vouched for by them. The contents of gold are about $40, the balance is silver and the contents of lead, from 40 to 50 per cent., are not included. A lot from the Empire, a mine lying in the same zone as the foregoing, has assayed as high as 96 Au. and 186 Ag. per ton. The ores are so easily extracted with pick and shovel alone, that one man can take out ten tons per day, and that two miners have actually so far supplied the two furnaces of the company.

A second group of mines, the Grant, Sunburst, Ione, Summit, Esmeralda, etc., are situated on Mineral Hill, south-west of the Buckeye. The ores here are mostly stetefeldtites, and carry much quartz. They are, however, very rich in silver and gold, and assay from $80 to $800 per ton; but the occurrence is irregular and nest-like. The Sunburst seems to contain the greatest quantity of ore.

North-east of the Champion, and in the same mineral-bearing zone, across a cañon, a number of very promising mines have been lately discovered by LOUCKS, RIGSBY & Co. The East Star and Wide West appear to be the most prominent, and have been traced over 1,000 feet. The deposits lie also under a thin cap of limestone, and carry below this an iron cap of little depth. The following assays, made by the before-mentioned assayers, have been furnished me:

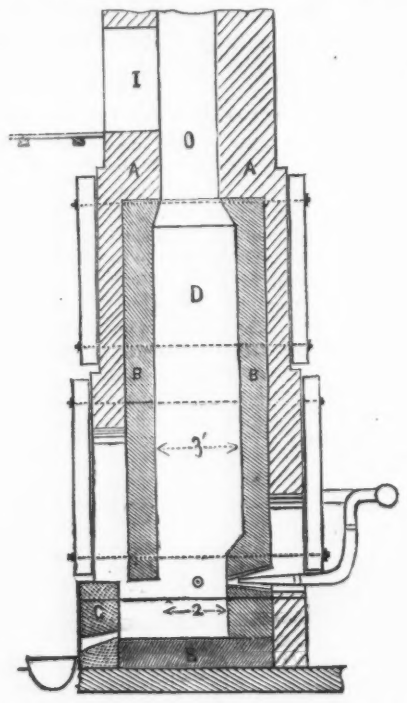
	SILVER.	GOLD.	LEAD.
1....	$404 33	$63 00	25 per cent.
2....	151 93	30 00	
3....	77 46	18 00	
4....	59 56	18 00	
5....	372 10	48 00	
6....	452 40	72 00	

An average, taken of all these samples after crushing and mixing, gave $307 26 Ag., $42 Au., and 12½ per cent. Pb. In these same claims an iron ore is found close under the limestone cap, and embedded in the carbonates, which assays $300 10 Au. and $16 96 Ag. It is probably a product of decomposition of the arsenical pyrites which are found undecomposed in the galena below.

Before closing this description of the mines in Eureka, I must mention a peculiar ore occurring in the Page and Corwin, a very important deposit in Secret cañon, seven miles south of Eureka. This ore is evidently a product of decomposition of iron pyrites and antimonious ore, but assays up to $2,000 per ton in silver. It mills from $200 to $500 per ton, according to selection. The quantity exposed is very large, as may be seen when I mention that the chamber opened is 40 feet in diameter. The ore is sent to Reno, and is there roasted in the Stetefeldt furnace and worked in the mill.

The carbonates and galena ores of the district are smelted at Eureka, as before mentioned. The district commenced producing regularly last December. All that time, only one furnace, McCOY'S, was in operation. Now there are ten furnaces already built, and three more in course of erection. Six of these furnaces were running at the time of my visit. They are all built after the same general pattern, which is not a very good one, as I shall show hereafter.

Mr. GUIDO KEUSTEL, a mining engineer and metallurgist, well known on the Pacific coast, has lately had occasion to visit Eureka. In a late number of the *Scientific Press* he describes the smelting operations and furnaces of Eureka as follows: "They are vertical blast or cupola furnaces, with a square horizontal section. The blast is admitted through three tuyeres, one at the back and one at each side. The mouth or nozzle of the tuyeres is generally three inches in diameter, admitting a very large amount of wind—too much, considering the horizontal dimensions of the furnaces, which are about two feet square, and the easy fusibility of the ore. The shaft is from twelve to sixteen feet high, from the tuyeres to the charging hole. The hearth is about two feet below the tuyeres, and is made of stone, the front part alone being formed of a composition. At the bottom of the hearth is the tap-hole, through



which the lead is run out at intervals. One tapping gives about two hundred pounds of pig lead, which, being run into moulds, forms bars weighing from eighty to one hundred and twenty pounds apiece. The furnace is built of stone found here, lined inside with a fire-proof sandstone, which is found at Pancake mountain, about twenty miles distant. This last is porous, and of an excellent quality. Lately sandstone equally as good has been found at Eureka. The blast is furnished by fan-blowers. The illustration shows the common style of furnace used. Here A denotes the walls, built of a sort of porphyry tufa; B, the inside lining of sandstone; C, the front of the hearth, of composition. The shaft D has a square horizontal section, and the shaft O a circular one. I is the charging hole.

"The ore is principally cerussite or carbonate of lead. There is also some galena, but only in limited quantities at present, and mostly changed into a dull, black mineral, retaining the structure of galena, and apparently unchanged in the centre. Singularly enough, the dull portion is richer in silver than the galena, from which it seems evidently to have been formed, perhaps by the influence of internal heat. It resembles stetefeldtite. On an average, the ore prepared for smelting contains 40 to 48 per cent. of lead, $60 to $80 in silver, and $15 to $20 in gold per ton. In bulk, the ore has a yellow color, due to the iron in it. There is also arsenic in the ore, which, in smelting, combines with the iron, forming a white compound (speise), somewhat like matt, and holding $36 to $45 per ton in silver and gold, and 24 per cent. of lead. The ore smelts readily by itself, nothing being added except about 20 per cent. of slag.

"Analysis of the slag shows the following composition. For the sake of comparison, the composition of a Freiberg slag is also given. No. 1 is the slag from Eureka, and No. 2 that from Freiberg.

	No. 1.	No. 2.	
Silica	30.20	36.50	
Iron (suboxide)	50.60	40.50	To form this requires 2,660°, Fahr., and to melt it when formed, 2,402°.
Alumina	3.01	8.50	
Lime	7.10	4.00	
Magnesia	0.90	3.00	
Lead (oxide)	8.70	7.50	
	100.51	100.00	

"There is a little too much iron in the slag No. 1. For the protection of the furnace lining a somewhat larger proportion of quartz in the ore would seem to be advantageous. Yet as as it is, there is a most fortunate coincidence of all the requirements for easily smelting the Eureka ore. About 24 pounds of charcoal are charged into the furnace at one time, and from 40 to 45 pounds of ore, besides 12 pounds of slag. The charging is done in a very irregular manner, by shovels and without weighing or measuring. One furnace can smelt from eight to nine tons of ore in 24 hours. Three and a half tons of ore yield about one ton of pig lead, or "bullion," as they prefer to call it. The consumption of charcoal varies from 30 to 35 bushels to the ton of ore. At present, it costs about $20 to smelt a ton of ore; it is probable, however, that, by using a furnace of larger capacity, the expenses may be reduced to $14 or $15.

"When the furnaces are properly managed, the loss of lead will probably not exceed 20 per cent. At present, however, it is larger, owing to several reasons, and very largely to the very frequent use of crowbars about the hearth, whereby a great deal of lead is mixed in with the slag. By using such large tuyeres, it would seem that too much wind was brought into the furnace, and without sufficient pressure. Hence the heat is not concentrated in the smelting region just above the tuyeres, but is diffused in the upper part of the furnace, and the carbonate of lead commences to melt at a distance of one or two feet below the charging hole, and the lead is thus exposed a long time to volatizing influences. Hence, also, in the hearth the temperature is too low, the slag stiffens, sticks to the walls, makes the constant use of the crowbar necessary and takes up mechanically considerable lead. Again, the ambition of having a very long run induces some smelters to keep the furnace at work when it evidently needs repairs, and this is another source of loss of lead and silver.

"The amount of speise (the combination of arsenic and iron) is about three per cent. of that of the ore. At present this is not treated further.

"The bullion contains on the average about $170 in silver and $80 in gold, or a total of $250 per ton. This statement must be taken, of course, as a very general one. The lead is at present shipped to Newark, N. J., for the purpose of extracting the silver and gold. There is nothing to prevent its being cupelled at Eureka, but different circumstances induce the companies to send it away.

"A large furnace, with five tuyeres, and capable of smelting 24 tons in 24 hours, is now being built by the Eureka Smelting Company, under the superintendence of Mr. CH. V. LIEBENAU. This furnace will be six-sided, and in the middle of each side, except the front one, comes a tuyere directed towards the centre of the furnace. The diameter of the furnace, or rather the distance of the centres of opposite sides, is three and a half feet at the level of the tuyeres, and four feet at the level of the feeding hole. From the tuyeres to the feeding hole is 16 feet. The furnace will cost between $2,500 and $3,000."

This description is generally quite correct, and it will only require a few additional remarks to make it complete. At the same time I will try to point out the very serious defects which the present system of smelting is suffering under. Not all the furnaces are rectangular inside. I know of at least one which is round. You see from the sketch that the furnace here figured has a sort of boshes on 3 sides, commencing about 1½ feet above the tuyeres. Above, and just below the charging hole, the shaft is also contracted, and the chimney is a foot narrower than the shaft.

This form of the furnace tends greatly towards the formation of iron sows, and also towards volatilization of an enormous quantity of lead oxide, which carries always silver with it. Mr. KUESTEL, in his article, does not give the result of experiments made by him and Mr. C. v. LIEBENAU, at Eureka. According to these, I am informed from the most reliable source, i. e., one of the experimenters themselves, thirty per cent. of the silver and forty per cent. of the lead contained in the ore are lost at present, and this is really enormous. Another very bad feature of the Eureka furnace is the large size of that part of the crucible lying outside of the breast. In fact, the whole of it, two feet wide and about one foot deep, is left entirely open. The consequence is, that a great amount of coal is necessary to cover up this space; that the heat, which spreads too much upwards anyhow, on account of the large quantity of insufficiently compressed blast, cannot be maintained in the crucible; that the slag, which is a low silicate, and is therefore inclined to stiffening, becomes cold and short, and mechanically incloses particles of lead, which go over the dump. This takes place the more, as iron is also reduced from the charge on account of the long time it is kept in a reducing zone on the boshes, and bars are therefore frequently introduced to loosen it. To do this the fore-crucible is opened and more heat is lost. Considerable silver has heretofore also been lost in the speiss which, to within a short time ago, went over the dump as "white iron." It is now saved, but not treated further for the present. I am informed that part of the dumps, especially

the oldest around the Eureka furnaces, assay as high as $80 per ton in silver.

As will be seen from Mr. KUESTEL's article, the proportion of coal used per ton of ore is extravagant for ores as easily fusible as those at Eureka. This is partly caused by the construction of the furnaces; but a great deal of it is also due to the treatment of the coal, which is transported in sacks instead of racks, and exposed to all kinds of weather, so that it always contains a large amount of moisture, and is rather small and soft.

In my opinion, the improvements required in Eureka to make smelting extremely profitable, are: 1. More careful burning of the coal, so as to obtain it hard, in larger pieces, lustrous and ringing; transportation in racks in the way done in Pennsylvania, New York, and the Eastern States generally. 2. Roasting of the ores in free heaps, with intermixture of small coal to volatilize part of the arsenic and sulphur. This ought to be done at the mines, where wood is much cheaper than in Eureka. 3. The furnaces must be differently constructed, i. e., the walls must come down straight to the hearth, or contract gradually about one foot in the whole height from top to bottom, like the Rachette or the Pilz furnaces; the mouths of the tuyeres ought to be narrowed from three to one and a half inches, and pressure blowers ought to be employed instead of the fan-blowers now used. The fore-crucible ought to be closed, so as to protrude not more than four inches from the breast at the commencement of the campaign, and not wider than six inches. 4. As long as no dust chambers can be connected with the furnaces (which would undoubtedly be the best), the stack ought to be rather wider than the furnaces than narrower, so that the draft may be reduced to a minimum, and thus the escape of dust be prevented as much as possible. 5. Regular charges ought to be carefully mixed on the charge-floor, before the ore goes into the furnaces, which is not done now. The silver quartz ores from New York and Secret cañons, and no slag should be mixed with the carbonates, so that a slag lying between a singulo and bi-silicate would be produced. Such a slag being hot, light, and not inclined to stiffening, mechanical losses of lead would be prevented, and the furnace-walls and crucible would last longer. I make these suggestions, not with a spirit of fault-finding, but because my own experience has taught me their correctness, and because I know myself supported in my opinion by every metallurgist who has seen the present mode of working the ores.

Portion of the Skeleton of a Mastodon Exhumed in Illinois—Dimensions of the Reconstructed Animal.

As has been noticed in our news columns, there was found near Aurora, in this State, not long since, a gigantic bone, supposed to belong to the skeleton of some of the extinct animals. It was discovered while digging a well in a low, sloughy place, and was imbedded in the earth, about seven feet from the surface. A gentleman connected with the Academy of Sciences, has recently visited Aurora, for the purpose of inquiring into the matter, and has brought back photographs of the relic. It belongs to the species of mastodon called *M. Giganteus*, and is the left *humerus*, the bone corresponding to that between the shoulder and elbow of man. It measures in length forty-four inches, in lateral diameter at either end one foot, and in the narrow part of the centre six inches. It is in a good state of preservation. Now, there seems to be nothing strange or curious in the bone of the mastodon having been found, for during the last ten years there have been a large number of these trophies unearthed in all parts of the country, and from a single bone so small that experts could only by dint of much study make out to which species it belonged, to a whole skeleton; they have been struck at various depths, from six inches to ten feet from the surface, and always in a situation that made it certain they had been kept moist, usually in a marsh; they have been found nearly always just below the black earth, and upon the marly clay, and usually the several pieces of a single skeleton have been found to be in various states of preservation, from the hard, rocky bone to a fragile, crumbling mass, ready to fall to pieces on being touched.

In none of these particulars does the Aurora specimen show us any marked difference from former discoveries, or reveal anything new regarding this gigantic beast, long ages ago exterminated. But in its size it far exceeds anything heretofore known, and indicates an animal of such monster dimensions that it staggers the imagination to conceive of it. Were not the individuals who took the measurements of this bone gentlemen of matured judgment and care, we should be strongly inclined to doubt the correctness of their figures. If the dimensions given are accurate, the specimen is nearly four inches longer than any other similar bone as yet discovered, and when fitted to the living body of its owner, must have formed part of an animal little less than fifteen feet high. The value of the trophy may be understood when we reflect that the tallest mastodon skeleton now known is about twelve feet high, that being approximately the height of Dr. WARREN's mounted skeleton in Boston, while the Cohoes mastodon, in Albany, falls but little below it. Of the two mounted specimens in our own Academy of Sciences, the tallest measures eight feet and nine inches. Both of these, however, it is quite generally conceded, were somewhat younger than adult animals. The bones dug up at Wheaton last year—which, by the way, have been secured by the Academy, and will soon be deposited permanently in its collection—are a little less in size than the Warren mastodon. A few bones recently brought from Peru, Indiana, by the same institution, are considerably larger than these, but fall far short of the dimensions of the Aurora specimen. Let those who have been frequenters of the museum on Wabash avenue, and who have been amazed at the proportions of the larger mastodon as he looms up by the side of the skeletons of the horse and ox, imagine him—if they can—increased in size until his vertical measurement shall be six feet greater, and then wonder that a race of the brute creation, which reckoned among its number even though but few of these colossal animals, once overran this whole land. Such they undoubtedly did; for they are being exhumed from swamps and wet places all over the country, and might, without doubt, be found in the dry earth too, were it not for the fact that here, subject to alternations of moisture and dryness through the ages, they have long ago gone back to the dust they came from.—*Chicago Tribune.*

Volger's Theories of Veins.

BY A. MEZGER, M. E.

Among the many theories about the origin of veins, those of Prof. VOLGER, in Frankfort-on-the-Main, certainly receive too little attention. He made them public, so far as I know, for the first time in the assembly of German Naturalists and Physicians, in Carlsruhe, in 1858. Long ago the striking effects of capillarity provoked attention, and especially the capillarity of fluids containing salts in solution, gave some facts, which showed that the two physical powers, crystallization and capillarity together, are capable of exerting an immense power, and that in the whole history of the earth they play a very important part.

Prof. VOLGER made at the time mentioned the following accidental observation. He left by accident in a common earthen pot, covered inside and out with a common lead glazing, a solution of sulphate of copper in water, and forgot for a time all about it. When he found it again, he observed that the water was evaporated, and that the pot was broken in pieces, which were held together by small veins of sulphate of copper. Notwithstanding the glazing, the fluid had entered into the clay, the water evaporated through the outside glazing, and cracked the whole pot only in thin scales of about 1–1½ inches in diameter, without breaking it in any other direction. In consequence of this observation, Prof. VOLGER made experiments to investigate the matter more completely. He fastened a number of glass plates together, and put them so in a solution of salt, so that the fluid was raised between them by capillarity, and that crystals could be formed. The result was that the plates were forced asunder and broken, together with the strings holding them, by the crystals. Experiments for the same purpose, made by other savans, proved that the force executed by the crystals under such circumstances is immense and incalculable.

Another fact which deserves notice in this connection is the long known force of the freezing or crystallizing water. All these facts and observations caused Professor VOLGER to give the following theory, which certainly is correct for a good many veins: Suppose, a crystal of some mineral is formed in the interior of a large mass of stone, of microscopical size, in a hole of microscopical dimensions. The surface of contact between the crystal and the surrounding stone presents a new space for capillarity to work in, and the first crystal becomes larger. At last it wedges the stone apart; at first, it may be only for a part of an inch, conquering only the elasticity of the adjacent part of the stone. This first fracture forms a new field for the operation of capillarity, new crystals are produced, until finally the fissure reaches fifty or more feet in diameter, when there is nothing that can resist the further extension of the fracture. Even whole mountains might be moved by the immense force, which cannot be calculated even from experiments in a small scale.

The structure of the vein will depend upon the question whether the fracture is raised by the operation of capillarity over the whole surface of the vein, or if it had certain centres of crystallization. In the first case the vein will be solid; in the second it will contain free crystals.

This theory was given by Professor VOLGER at first as general and applicable to all veins. To prove this would, however, probably be a quite difficult task; but it is sure, on the other side, that his explanation is a rational one for a good many veins. I do not hold this theory to be as general in its application as Professor VOLGER does, but we must acknowledge that it is plausible, and should keep its place among other theories, a part of which is certainly, in some cases, more distant from the truth than his.

Another not less general theory of Professor VOLGER, also connected with the capillarity and crystallization, is the one about the often-repeated folding of strata. To every one beginning the study of the various kinds of rocks it is a striking observation, that the carbonate of lime is most changeable. It takes the form of other minerals, and leaves holes which show its own forms clearly. Suppose now a stratum of limestone is subjected to the effects of a solution of carbonate of lime, which is easily found when rain-water, which always contains a little carbonic acid, is brought in contact with lime on the surface of the bed and permeates through the whole mass. A bed of limestone consists commonly of immense numbers of microscopic crystals of carbonate of lime, mixed with more or less clay. The effect of the solution of lime will be to increase the size of each crystal, and thus to increase the dimensions of the whole bed in all directions. Upwards there is of course abundant room for the limestone to expand itself, but being surrounded on all sides by other rocks, which prevent the lateral enlargement of the bed. The way in which this increase in size can proceed is by a slight bowing-up in the centre, forming a flat dome, which, however, not being strong enough to support the weight, falls in, presenting wave-like undulations. As the process goes on, year after year, the waves would become higher and the vallies between them deeper, until they became almost vertical. Now if we suppose an erosion of the tops of these waves and a filling of the vallies between them with some other substance, we have the explanation of the phenomenon of a number of conformable strata of limestone standing almost or quite vertically, which is not easy of explanation by other hypotheses.

Artesian and Oil Wells in the Coal Measures of Indiana.

From Mr. Cox's first Annual Report.

IN order to show more clearly the position of the coal strata and subordinate formation in Clay county, a vertical section is given, which represents the geological order of the strata between Greencastle on the east and Terre Haute on the west, constructed from outcrops along the line of the Terre Haute and Indianapolis railroad, and from the record of deep bores. In the city of Terre Haute, at about the level of the crossing of the Terre Haute and Indianapolis and the Evansville and Crawfordsville railroads, a bore was made for Mr. Chauncey Rose, which went to the depth of seventeen hundred and ninety-three (1,793) feet, passing through the carboniferous, and stopped in the subcarboniferous rocks, just above the Marcellus shale, as I propose to show by the comparison of its section with that of other bores.

At Terre Haute, three horizons of salt water are noted in the carboniferous strata, and there are probably others, still lower down, that are not recorded, for the reason, possibly, that the brine above was not stopped out, but allowed to fill the bore for some depth below.

[Since writing the above I have been credibly informed that good brine was reached at several horizons in this space, and that at thirteen hundred feet a brine was struck which indicated 13° on Baume's Saltometer. Fifty gallons of brine of this strength will make one bushel of salt, fifty-six pounds.]

A "show of oil" and two oil veins were passed, from the lower of which there was a considerable flow of oil. The sulphur-water which is found in the lower one hundred feet, rises to a considerable elevation above the surface, with an irregular pulsating flow, and is mixed with gas emitting a strong odor of sulphuretted hydrogen, and leaves on the reservoir a deposit of sulphur. The analysis made of this water, for Mr. ROSE, by J. G. POHLE, M. D., indicates that it possesses fine medicinal properties. From one gallon of the water he obtained 365,067 grains of solid matter, composed of

Chloride of sodium	316,000	grains.
Chloride of magnesium	6,428	"
Chloride of calcium	4,816	"
Chloride of potassium	1,232	"
Bicarbonate of soda	520	"
Sulphate of lime	2,325	"
Bicarbonate of magnesia	6,420	"
Bicarbonate of lime	25,026	"
Silicic acid and alumina	1,200	"
Nitroginous organic matter	1,100	"
Bromide of magnesium	trace.	
Sulphide of calcium	trace.	
Phosphates of lime	trace.	
Also, sulphuretted hydrogen and carbon gas.		
	365,067	grains.

For the record of the bore at Reelsville, on the Walnut Fork of Eel river, in Putnam county, I am indebted to Mr. DAVID N. BARNETT, who lives a few miles south of the well. This bore is twelve hundred and forty (1,240) feet deep, and notwithstanding it commences by the railroad levels, one hundred and seventy-six (176) feet above Terre Haute, it starts in strata that are geologically seven hundred and fifty-four (754) feet below the surface at that place, and penetrate strata that are two hundred and fifty (250) feet below the bottom of the Terre Haute artesian well.

This difference in the geological horizons of the two places is readily accounted for, by a very slight dip of the strata to the west. At Reelsville four horizons of salt water are passed, one in the subcarboniferous limestone, two in the subcarboniferous sandstone, and the fourth below the Marcellus shale, and probably in the Devonian. Near the bottom of the well, and in Silurian strata, artesian sulphur-water is reached, that appears, from the taste, to be very similar, in its mineral constituents, to the artesian water at Terre Haute. It rises in a copious stream to the height of twenty feet or more above the surface.

Now, taking this Marcellus shale as an established base, and arrange accordingly the sections of the bores just spoken of side by side, and assuming that the bore at Terre Haute stopped near the top of the Marcellus shale, a remarkable correspondence of the strata is perceived in the two bores, the agreement being almost as close as one could expect to find in two bores at a much less distance apart.

As we go westward the subcarboniferous limestone appears to have given place to shale and sandstone. The former is three hundred and twenty feet thick at Reelsville, but is only thirty-seven feet thick at Terre Haute, and was not found at all at Lodi—though a few feet of limestone, equivalent to the Keokuk limestone, is seen at the base of the millstone grit at Williamsport, about twenty-five miles a little east of north from the former place.

In the record of the bore at Lodi, Mr. COLLETT, for whose opinion I have great respect, marks the base of the conglomerate at five hundred and sixty-five feet; but in this I must differ from him, and place it at the depth of two hundred and three feet and nine inches. In justification of this correction, it may be well to state, that the millstone grit is found a few miles to the northeast and south of Lodi, and is universally along the margin of the basin, overlaid by coal seams, with no great space intervening, and very often coal is found below it.

Important Mining Decision.

THE suit held against the Union Copper Mining Company and others has been finally decided by the Supreme Court of California. The plaintiff recovers two-thirteenths of the mine and also judgment for $124,598, which sum represents his share of the net proceeds of the mine appropriated by the defendants, implying that the total net proceeds were more than $800,000. As to the rule by which this sum was ascertained, we have no information.

Mr. REED, the discoverer, or one of the discoverers of the mine, put the names of his wife and daughter in the list of the

owners of the mine posted up on the claim, but this list was soon afterward taken down by the majority of the owners of the mine, and another list was substituted, omitting those two names, and from that time forward they were treated by those in possession as if they had no interest in the mine. The daughter brought suit to recover, and at last, after six or seven years of litigation, it is decided. The court hold that when a title to a mining claim has been vested in a person under the mining customs, it cannot be taken away, except by due process of law. The daughter in this case was a minor at the time, had no part in the discovery, contributed nothing to its expense, and knew nothing of the insertion of her name in the notice at the time. Yet, after it was done, those who put it there could not take it away, any more than after recording a deed, giving certain real estate to a child, they could take it back.—*California Alpine Miner.*

MINING SUMMARY.

Nevada.

RICH SILVER ORES.

The Reese River *Reveille*, Sept. 5, says:—"The following table, which we compiled from the books of the Manhattan Company, presents an extraordinary lot of ore from the district of Secret Canyon, in this county, and that of Mineral Hill in Elko county, all of which were worked during the past fortnight. We doubt if the record of any works anywhere for the reduction of silver ore can surpass or equal the list:

MINES.	POUNDS.	VAL. PER TON.
Saratoga)	39,512	$786 41
Aurora West	70,000	326 25
Tuolumne	2,100	949 73
Morris & Caple	2,000	2,788 94
" "	7,982	819 91
Dollarhide	3,208	945 00
Oregon	4,288	429 22
"	5,940	738 31
"	5,850	809 00
Plymouth	6,386	859 26
MINERAL HILL.		
Northey & Co	2,000	887 92
" "	7,812	937 72
" "	3,410	830 20
SECRET CANYON.		
Paige & Corwin	24,832	539 98

"While these must be considered grand results, they are by no means as grand as this and other districts are capable of. Small lots of very rich ore may build up but they will not sustain settlements. The low grade ore of a district, which is the great bulk of its product, must be relied on to maintain large and prosperous communities. Rich ore benefits the individuals, but the poorer or ordinary grade promotes the interest of the whole. Our experience teaches us that the time has arrived for utilizing those large bodies of ore, worth from $40 to $70 per ton, which have been hitherto wasted or neglected. The period of speculation has passed and it is time that we should begin to understand and husband our resources. If any miner owns a mine in this vicinity that will produce $40 or $50 ore in any reasonable quantity, we advise him to make his title clear and hold on to the property, for the day is not distant when it will be valuable. Our merchants are directly concerned in this matter of increasing the production of the district. It might be wise in them to offer inducements to miners and prospectors to develop neglected mines of low grade ore, some which might be found to contain enough silver, under skillful and economical management, to pay."

COPE DISTRICT.

The Editor of the Idaho, Owyhee, *Avalanche*, having just returned from a trip to Cope, gives a few facts in relation to that promising district, which is attracting considerable attention from the mining world. Mountain City is pleasantly situated on the east bank of the Owyhee river, in a little valley about half a mile wide, and probably two miles long. It is 102 miles in a southerly direction from this place, and 85 miles north of Elko. The town proper consists of about 130 buildings, fully one-half of which are constructed of canvas, the remainder lumber, adobe, etc. The present population is estimated at 600. About a quarter of a mile below Mountain City, and on the opposite side of the river, is a little hamlet named Placerville, containing one store, blacksmith shop and several family residences. There is one 10-stamp mill (DREW'S) in operation; two more are in course of construction, and will be ready to start in about six weeks. One of these is owned by NORTON & GUSHWILDER, and consists of 10 stamps, the other belongs to VANCE, an old Pacific-Coast mill man, and is intended to run on ore exclusively from the Mountain City mine. It is some kind of a "grinder"—no stamps—and the proprietor claims for it a working capacity of thirty tons per day. The mines are located within the immediate vicinity of town, on both sides of the river. As far as surface indications go, the quartz veins of Cope will compare favorably with any other mining camp we ever saw, but none of the ledges have yet been worked to a sufficient depth to establish their permanency beyond a doubt. The ore is principally silver, and remarkably free of the baser metals. A claim consists of 200 feet, upon which two days' work must be done within sixty days after location, and two days more before the expiration of a year. The principal ledges are from a foot and a half to four feet in width, and approach a horizontal position, many of them having an angle of 40°. At present there are only about twenty men at work taking out ore, but many more will be employed as soon as the two new mills are ready to operate. The Columbia Company have struck the eastern extension of the Argenta, 1,400 feet from the discovery shaft, demonstrating the fact that the ledges of Cope have some length, as well as width and depth. JOHN A. LYTTLE & Co. have traced the Nevada ledge down the side of California Hill, and are running in a tunnel on the vein, which is said to be large and rich. CUTLER & Co. are sinking on the Crown Point, opposite, DYE'S store, in Placerville, and are taking out some fine-looking ore. The Argenta and Crescent have been worked some distance below the water level, and show black sulphurets in abundance. The Buckeye, owned by COPE & Co., shows a large and well-defined ledge on the surface, but has not been worked to any depth. The Monitor, situated near the Crescent, is one of the most promising ledges in camp. It is five feet wide, and will probably yield $50 or $60 per ton. Our limited space forbids the mentioning of many other ledges which prospect well, and which will doubtless prove as rich as any that have hitherto been worked. The mines are easier worked than here; a three-foot hole can be put in without drills. The citizens of Cope are just now considerably excited over Bull Run District, about 18 miles west of Mountain City. The mountain in which the principal mines are located, is 8,750 feet above the sea level, and is very rough and rugged, with plenty of wood and water. The ledges are wide, contain lead enough for smelting purposes, and are said to assay from $150 to $500 per ton in silver. There are about one hundred men in the district, and more arriving every day. Bruneau, 25 southeast of Mountain City, is also attracting much attention. The ledges are large, contain a large amount of lead and other base metals, but are said to prospect well in silver. Wages for miners in Cope are $4 per day, with some talk of reduction; wood-choppers, from $50 to $60 per month; teamsters, $75. Board is $7 to $10 per week; single meals, 50 cents. Market prices in Mountain City range as follows: Flour, $4 per sack; bacon, 30 cents; sugar, 25 cents; coffee, 83½ cents; butter, 50 cents; eggs, 50 cents; tea, $1 25; potatoes, 7 cents; nails, 16¾ cents; dried apples, 25 cents; rot-gut, $3 per gallon. Stock is ranched for $3 per month. At present, in Mountain City, the weather is at least ten degrees hotter than here, causing the transient population to seek the shady sides of streets and imbibe a large amount of iced beverages and lager beer. High winds prevail, and were it not for the luxury of a water-cart with which the streets are kept sprinkled, the dust would be almost insufferable. The nights are cool and pleasant—indeed so cool that last week ice was formed a quarter of an inch in thickness. In winter the weather is said to be much colder than in Owyhee, although the snow seldom falls to a depth of more than eighteen inches. There is an abundance of cottonwood four or five miles away, which sells in town for $7 per cord. HOOKER & MCFEE'S saw-mill is eight miles from town. They deliver lumber (white fir) for $75 per thousand. Money is scarce in Cope, and people complain of hard times, but this cannot be wondered at when it is taken into consideration that the entire support of the town has hitherto been derived from one 10-stamp mill. Located on the great highway from the railroad to Idaho, and surrounded by Bull Run, Bruneau, and other mining camps, of more or less importance, Mining City, with her splendid facilities for water mills, is destined to increase in size and be a flourishing place, though her own mines should not prove as rich as anticipated. At least half the population of Cope are Idahoans—many of them from Owyhee.

California.

THE SAN DIEGO MINES—MILLING EXPERIMENTS.

The San Francisco *Scientific Press* has from Mr. J. T. DOUGINE, an old mining pioneer, recently from San Diego, the following interesting items of mining intelligence:—"To give a detailed description of the locality of the mines is now unnecessary, after all which has been said. We will remark only that, according to the account given us, the mines are in a belt of slate and talc, about a mile wide, situated between granite walls which have a general direction of southeast and northwest. On this belt there is a good deep soil, good wood and also pasture lands, but on either side the country is barren. The most promising ledge, Mr. DOUGINE thinks, is one a little east of the centre of the belt, having the general southeast and northwest direction, on which are the San Diego, High Peak and Owens, and being very likely the same on which the Helvetia, a new and promising location, is situated. The mines have not been thoroughly prospected, however, as yet, and their true value cannot be said to have been really ascertained. Besides, the mining operations have been carried on, in many instances, in an unsystematic sort of way, which involves heavy expenses and small returns, and this has an especially bad effect, as there is so little capital in the camp. The matter of the Cuyamac grant has not been settled as yet, and this naturally has no favorable effect on mining. The gold exists, as far as developments have gone, in a free state in the rock, there being no sulphurets present in any amount. The quality of the gold obtained is good, running from $17 94 to $18 45 per ounce. The amount of this metal in the various ledges varies very considerably. There is a large vein of quartz, ten feet wide, which is quite barren, as far as known, and others assay quite high. As assays are by no means so valuable as milling results, we are glad to be able to give the mill returns of a number of lots of ore. These are, of course, not given as the absolute values of rock in the different mines, for in the same mine very different results can be obtained. This is shown in one or two of the examples given. Yet mill results are very instructive, and therefore we publish the following.

MINE.	AMOUNT TREATED. TONS.	YIELD PER TON.
Lone Star	7	$7 00
" "	5	70 00
Shamrock	7	3 50
Eagle	10	2 90
"	5	2 75
San Diego	19	15 00
"	51	*6 00
Owens	16	51 00
Keystone	4	7 00
High Peak	10	42 00
Sherman	4	4 82
Hannon	3	3 50
Pride of the West	1½	31 00
White Fawn	3	0 37
North Star	6	4 50
North America	6	4 60
Monitor	6	4 00
Ella	3	1 25
Forty-Nine	12	12 50
Hayden	19	40 00

There are two mills in the district—Cotton's, running five stamps, and the Wilson Steam Stamp mill, two stamps, owned by J. McMeehan. Being naturally curious with regard to the Wilson mill, we inquired particularly as to its work. Mr. DOUGINE spoke of it in the highest terms. He has had charge of it, and has been running it from the middle of June to the present time, with, perhaps, a couple of weeks intermission in all, when there was no ore to be treated. Mr. D. has made a number of experiments, with from 60 to 90 pounds of steam and a varying number of drops, etc., but obtained the best results with 70 pounds of steam and 412 drops per minute (206 of each stamp). On August 10th, he crushed 10 tons 800 pounds, of Hayden rock in 8 hours 45 minutes, using *one cord* of wood (oak). On August 11th, 8,590 pounds of the hardest rock obtainable were crushed in 5 hours, with 65 pounds of steam. On August 12th, with 68 pounds of steam, to crush 10,800 pounds of ordinary rock, required 4 hours 50 minutes. In July, 51 tons were crushed in 47 hours. The average amount of ore which can easily be crushed in a day (of 24 hours) is 28 tons, with a No. 6 slot screen, and using not over three cords of 4-foot wood; the average consumption of fuel is one cord to 10 tons of ore. The durability of the mill is very great, no breakage having occurred, and there being no signs of any probability of a breakage. In every part the mill has worked wonderfully well. It took just six days to set up the machine ready for work. It is so simple, durable and economical, and so efficient, that Mr. D. has thought it worth while to get the certificates of the employees, amalgamator, rock-breaker and battery feeder to all the facts which he states, in order that there may be no doubt on these points. Taking these points into consideration, and not forgetting its comparatively very low cost, it would seem that the mill must be pronounced a great success. It is thought that, at San Diego, $6-ore can be mined and milled at a profit, where this mill is used and the same party owns both mine and mill. It would appear, then, that with proper management, San Diego might add very essentially to the bullion production. It may be stated in conclusion, that at present 4-foot oak costs there $3 per cord, and that for custom work, the mill rates are: for sample lots, $10 per ton; for 50-ton lots, $7; for 100 tons and upwards, $6 per ton. We should also state, in connection with the above figures, that the same boiler runs two steam pumps, one for feeding the boiler, and one for pumping back the water from the settling tank, this last being necessary on account of the rather scanty supply of that article."

* The last came from a place where the vein widened out to a much greater width than usual. The first results are probably nearer the general average to be expected.

MINING IN INYO COUNTY—THE CASO MINES.

Speaking of the mines of Caso District the *Independent* of Aug. 22d says: This is fifty-five miles from Lone Pine. It was abandoned in 1866 on account of the Indians. In 1868 a party of Mexicans settled there, and have now twenty arastras at work. The ledges are small, and mostly lie flat, but are very rich. The greatest abundance of ore is found in the Mina Grande, formerly the Josephine. The gold bullion produced is worth $15 per ounce, and the product between April and October is estimated at between $30,000 and $40,000. The Golconda mine, two miles from Owens river, was located two years ago, but little work was done. Capt. CHASE intends to have some of the very rich looking ore tested. A thousand tons could easily be taken out. Good chance now for capital.

The Los Angelos *News*, of 27th, says: Yesterday the train from Cerro Gordo arrived with three hundred and thirty-five bars of bullion, weighing 21,921 pounds.

LASSEN COUNTY.

The new diggings in Big Valley, discovered by HASKINS & Co., are said to be turning out richly, but only one spot of pay-dirt has been struck. From that they realized from two hundred to five hundred dollars per day to the hand with a rocker. The new district is twelve miles south of the Siskiyou county line, in Lassen county, forty-five miles from Susanville.

GYPSUM IN SAN JOAQUIN.

The Stockton *Independent* of the 15th ult. furnishes the subjoined: For some time we have heard of discoveries among the foothills on the western side of the San Joaquin river of various mineral deposits, the principal of which were coal and silver. In Ingraham cañon, upon the Arroyo del Puerta, and in various other cañons further to the south, coal was found, and a drift is now in on the Arroyo del Puerta some seventy feet. Some years since an attempt to discover coal was made on the same stream, but abandoned upon the death of the principal prospector, by an accident in the tunnel. Prospectors have frequently commented upon a mineral seen in small seams of the sand rock, and to be picked up loose frequently upon the hill-sides, having the transparent and crystalline appearance of mica, or isinglass stone, but without the elasticity and toughness of isinglass, but the veins were too insignificant to induce development, while no beds of it could be discovered apart from the sand rock. Recently, however, the matter has been taken in hand by parties more familiar with the mineral, which they pronounce to be gypsum, better known as plaster of Paris, from its abundance in the tertiary strata of the city of that name. Diligent and careful search revealed one or more "leads" of such extent and character as to warrant an effort at development. To that end a survey was made, at the instance of an organized company, and steps taken to secure the land. Machinery, it is said, has been ordered, and sufficient ground and water front secured on the San Joaquin, at Grayson, for the preparation of the mineral for market, and in a few weeks we may expect to have more definite particulars of their intentions and prospects.

TUNNEL TO LAKE BIGLER.

According to the Auburn *Stars and Stripes*, VON SCHMIDT & Co. will commence a tunnel for tapping Lake Bigler within a month or six weeks. The tunnel will be commenced at the head of Square Valley, where the distance through the mountain will be about three miles. The time necessary to complete the tunnel is estimated at twenty months. The project has been talked of for years, and there is no doubt of it being feasible—the only question is, will it pay? One thing in its favor is, that the supply would be perpetual and ample. The flow of one hundred thousand inches from the lake to this side of the Sierras would make scarcely any perceptible difference in its height.

CLARK MINING DISTRICT.

The San Bernardino *Guardian* of the 13th ult. has the following concerning this district: We were at the Clerk's office one day last week, and found him busy recording deeds of claims sold by lucky discoverers in that district to outside parties. Among the deeds we noticed one for $38,000 and one for $37,800, with stamps to the value of $38 upon each. A large amount of property has changed hands in Clark district, and from the richness of the mines we have no doubt there will be a large population there in a few weeks. The mines are situated in the north-eastern part of this county, about seventy-five miles from Camp Cady, with a good wagon road from San Bernardino.

Illinois.

SMELTING FURNACES AND ROLLING MILLS TO BE ERECTED AT PEORIA.

The Peoria *Review* has the following:—"For some time past there have been rumors of the discovery of iron in the lower part of this county. There are now lying on our desk two specimens of bog ore that came from that locality, and that are said to be extraordinarily rich in iron; but rumors were so vague that few people paid much attention to them, and no one knew where the reports originated, or whether there was any substantial foundation to them or not. Yesterday, however, there were filed for record in the clerk's office, in this county, one hundred and nine warranty deeds and leases for nearly all the coal lands in Hollis, Timber, Logan, and Trivoli townships. The leases for coal and all other minerals—and some idea of their extent can be gained when we state that the smallest is for thirty acres, and the largest for *nine* hundred, and that in the aggregate they cover over *nine thousand acres* of land, the deeds and leases are made to MILTON SUTLIFF, DWIGHT R. CHAPMAN, MOSES J. RICHARDS, and JOHN PHILLIPS. These gentlemen have been connected with iron operations in Ohio. Mr. SUTLIFF was formerly Judge of the Supreme Court in this State, and one of the old line abolitionists of the school of GIDDINGS. He went into manufactures, and has become immensely rich. He now resides in Warren, Trumbull county, Ohio. Mr. CHAPMAN resides in Hartford, in the same county, and is also very wealthy. Mr. RICHARDS is junior partner of Mr. SUTLIFF. They are the corporators of a large

company. About two years ago, while on a prospecting tour, with a view of settling somewhere in the West, they heard of Peoria, and spent some time in looking up our coal interests. They speedily became convinced that this vicinity offered great inducements to capitalists, but desiring to make further investigations they sent from the East a corps of practical men to make an investigation of the property they thought of buying. They at first only thought of coal, but as soon as the prospectors cammenced operations they discovered that the bluffs were full of a choice quality of limestone suitable for flux for smelting, and better than the famous Joliet stone for building. Pursuing their investigations still further they finally discovered a large deposit of iron ore in the form of an oxide. They sent several specimens to different assayers in the East, and all pronounced it a superior ore, yielding 95 per cent. of pure iron. The company immediately leased all the land designated by the prospecting party. This has been satisfactorily accomplished, and the corporators are expected to be here next week to commence operations. Their scheme is to erect a smelting furnace and rolling mill at Kingston. They say this is one of the best points in the United States for such works, owing to the cheapness of fuel and the abundance of scrap iron and steel to be found in this vicinity. They have said very little about it, because they did not want any assistance from our citizens."

Canada.

MADOC GOLD MINING DISTRICT.

So little is heard and said now-a-days about the gold mines that one is apt to forget that this is still by law the "Madoc Mining Division," and that thousands of acres in it are yet for sale as Mineral Lands. "We occasionally see, however," says the *Mercury*, "fresh specimens of gold, generally obtained by panning, which are brought to the village for sale, and which serve to show that some prospectors are still quietly at work. At the Phœnix (Richardson) Mine, little progress has been made of late, owing to delays in getting the machinery ready for keeping the shaft clear of water. At the Feigel Mine, in Marmora, work has been stopped this week, owing to a disturbance arising out of a disputed claim to property. Mr. G. HAYES, whose name will be remembered as the claimant to be the original discoverer of gold on 'Nine in the Ninth,' is occupying premises, to which other parties lay claim. They attempted to dispossess him forcibly on Monday last, and as he objected to this summary mode of proceeding, arguments in the shape of revolvers, bowie-knives, and other offensive weapons were produced. A gun was brought out in reply, and though no one was hurt, the dispute is not yet ended, and there has been quite an excitement about the affair in the neighborhood ever since. The case is likely to come up for hearing before a magistrate in Madoc to-day (Saturday, Sept. 3.)

British Columbia.

By the last mail we have Victoria (V. I.), dates to Aug. 18. Intelligence from the Cariboo mines is generally encouraging, the various companies washing out good amounts of gold, and all seem to be paying. A prospecting party has been exploring the Leech and San Juan rivers for gold and silver. They bring highly encouraging reports. On the San Juan they found good prospects of coarse gold, washing out $2 37 in three hours wi h a pan. They believe the ground forms part of an old channel, and that they have found a good thing. Other parties are being formed for more extended explorations. Immense fires are raging in the country districts. A great breadth of open land has been swept as with a fiery besom, and several farm fences destroyed. No crops have been swept off so far as heard from; but the destruction of valuable timber is immense, and the work still goes on.

A coal mine has been opened at Newcastle Island, two miles above Nanaimo. The seams are four to eight feet in thickness, and the quality is good, especially for domestic purposes. It is delivered on board ship for $5 50 per ton, and the deposit is supposed to be of very great extent. The quality is expected to improve as the work progresses. The *Colonist* says the Bellingham Bay coal is not to be compared in quality with this.

SPECIAL SCIENTIFIC BREVITIES.

Torpedoes.—The engineering works of Messrs. SIEMANS & HALSKE, London, and the extensive iron foundry of BORSIG, are now almost exclusively occupied with the manufactory of torpedoes. It is said that great improvements have been made in these war engines; the point chiefly kept in view being to make them movable from the shore by means of an electro-magnetical rotary apparatus.

Economizing Fuel.—A patent device for economizing fuel has recently been put into the Lewiston (Maine) Mills. It consists of a hopper and a mill for grinding coals, reducing the fuel to fine dust, which is carried by the blower into the furnace with air enough to produce immediate combustion. The coal-dust leaps into flame like a flake of powder. It is claimed that this device saves thirty-three per cent. of the expense of making steam. It is said that steam can be generated in one-half the time required by the ordinary use of fuel.

To Unite Steel.—It is proposed by Mr. J. ABSTERDAM to unite cast steel or Bessemer steel or case-hardened wrought iron, either by pouring the molten cast or Bessemer steel against plates or slabs of blistered steel or case-hardened wrought iron, or he heats the bar of cast or Bessemer steel to a yellow heat, and the bar of cement, steel, or case-hardened wrought iron to a welding heat, and places them one on top of the other under a suitable press capable of exerting a pressure over the entire surface of the bars, and by this pressure the two metals are firmly united.

Liebig's preserving fluid for meat is made up, according to the patent specification, as follows: Thirty-six pounds of salt and a half pound of crystalized phosphate of soda; dissolved in ten gallons of water. The object of the phosphate of soda is to purify the salt of lime and magnesia with which it is commonly contaminated, and the amount may be advantageously increased when common sea salt is used. The solution is allowed to settle and is decanted. To eleven and a half pounds of this salt liquid, LIEBIG adds six pounds extract of meat, one and a half pound of chloride of potassium, and ten ounces of saltpetre. GAMGEE'S process and other methods have been duly noted during the past year.

Lighting Street-Lamps by Electricity.—It is well known that the use of electricity for lighting the gas-jets in the Capitol of Washington, has successfully withstood the tests of several years. The apparatus consists essentially in lava-tipped burners, to which small spiral wires of platinum are attached, and in their turn connected with the wires of a battery. A strong current of electricity being sent through the wires the platinum spirals retard its transmission to such a degree that they are heated sufficiently to ignite the gas. The New York *Tribune* says that a company is now forming (whether in Washington or New York is not stated) to promote the adoption of the invention of lighting streets lamps. It says that the company proposes the laying of a system of street-wires under ground, by which the application of the invention to the purpose will be made with great facility.

ON DIT ABOUT MINES AND METALS.

School of Mines.—The legislature of Colorado, at its last session, appropriated about thirty-nine hundred dollars for a building for a school of mines. The corner-stone of that building was laid with religious ceremonies on Monday, August 15th, by Bishop RANDALL, in the presence of a large assembly of people. The Bishop delivered a pleasant address on the occasion.

Nevada Milling Items.—According to the Reese River *Reveille*, the mill known as the Faulkner mill, situated on the road to Yankee Blade, has been purchased by Messrs. DAWLEY and MCGLEW, who intend to take it to the Montezuma district, where ore of a good quality is said to be abundant. The mill at Hot creek, which was started some time since by Mr. GROVES, formerly of Belmont, has stopped operations for the present for the want of a supply of ore. That at Washington owned by the Utica and Herkimer company will start in a few days under the direction of Mr. BATES, who thinks the prospects of the camp are fair.

Placer Mining Patent applied for.—The Commissioner of the General Land office, at Washington, has received an application for a patent for the CONLY & COGWELL gold-bearing cement claim, in Plumas county, California. The area of the claim is forty-two and one-tenth acres, the whole of which is reported to consist of quartz gravel, the lower portion being held together by a very hard cement resting on a soft yellow bed rock, having the appearance of clay. The overlaying gravel has an average depth of eighty feet, and the cement varies in thickness from six inches to ten feet. It is very hard when first taken out, but after exposure to the action of the atmosphere for one or two years it becomes decomposed. The expenditure upon the claim is estimated at $200,000. Specimens of the cement or rocky matter have been received, and will be placed in the alcove of the General Land Office cabinet allotted to California minerals.

Mica as a Coloring Material.—A means has been found of greatly increasing the value of mica by converting it into a coloring material. The *Journal fur Prakt. Chemie* says the mica is reduced to small pieces in a stamping mill, digested with chlorhydric acid, cleansed by washing, and sorted by sieves into sizes. The mica scales so prepared have a beautiful vitreous lustre, a silvery appearance, and bear in commerce the name of brocade crystal colors, or mica bronzes. The advantages of these brocades over the common metal ones are: 1. They contain no unwholesome substance; 2. They possess a metallic lustre like the metallic brocades, and much surpass them in splendor; 3. Brown, blue, black, green and red colors of rare brilliancy can be obtained, which is not the case with the metallic brocades; 4. They are not dimmed by sulphur vapors. The analyses by Drs. CECH and SCHNEIDER show that the coloring matters of the rose-brocade is cochineal; that of carmine is fuchsine; bright red, fuchsine and Havana brown; violet, Hoffman's violet; bright blue, Berlin blue; dark blue, probably impure aniline blue of Girard's violet; light and dark green, a mixture of aniline blue and curcuma; gold, curcuma; silver, the mica alone, etc.

The Miners of Europe.—The gross number of miners in the whole of Europe amounts to 1,275,000; of which there are in Great Britain 363,000; France, 206,500; Prussia, 184,800; Austria, 125,900; Belgium, 111,500; Russia, 80,000; Spain, 73,600; Italy, 36,000; Sweden and Norway, 29,000; Saxony, 23,300; Bavaria, 11,200; Switzerland, 5,100; Portugal, 4,200; Wurtemberg, 2,200; Baden, 2,100; Greece, 800; Netherlands, 800; and Denmark, 300. Reckoning the relatives of the miners and the furnace-men, the population which derives its living from mining amounts to 2,955,000 persons. Of these there are distributed in Great Britain 900,000 persons; France, 503,000; 503,000; Prussia, 523,000; Austria, 260,000; Belgium, 218,000; Russia, 180,000; Spain, 167,000; Italy, 75,000; Sweden and Norway, 75,000; Saxony, 56,000; Bavaria, 24,000; Portugal, 9,000; Switzerland, 10,000; and the rest of Europe 30,000 persons. The mining population of Europe, therefore, forms one per cent. of the whole.

The Big Horn Expedition.—In the recent fight between the Crows and the Sioux Indians, between the Big and Little Horn, the Crows, according to the Virginia City *Montanian*, captured 150 American horses and 40 head of mules from the Sioux, and it is reasonable to suppose that the stock belonged to the Big Horn expedition, as the fight occurred in the region traversed by the expedition, and the Sioux had no other means of getting such horses and mules that we know of. It is therefore highly probable that a part, if not all, of these hardy adventurers have met the fate of the scalping knife. In this connection it may interest some to know that the Crow Indians are divided into three bands or chieftaincies—the Mountain, Middle and River—and, all told, number about five thousand souls. They claim as their "illahee," or hunting grounds, all the country between the Gallatin valley and the Powder river, which embraces the best Buffalo and general game country on the continent. They are disposed to be peaceable, but were all, until the establishment of the Yellowstone Mission, jealous of intrusion; now, however, the Mountain Crows welcome the hunter and miner with smiles of friendship. Their territory is constantly encroached on by surrounding tribes; but, though few in numbers, they are noted warriors, and have thus far been able to maintain their independence and defend their territory.

How Strikers are served in England.—In the Crown Court, at Leeds, THOMAS SHAW, a collier, was charged with having committed a murderous assault on WILLIAM TAYLOR. It appeared from the evidence that early on the morning of the 28th of June, the prosecutor was met at a place called Parkin Wood, near Ecclesfield, by five men, including the prisoner, who came up to him and said, "You work at the Folly colliery?" and without waiting for a reply, the prosecutor being in the act of explaining that such was not the case, knocked him down into a ditch, and while there kicked him savagely about the body and head. The other men came up and joined in the attack, some of them throwing stones at the prosecutor, whom they called a "black sheep." He identified the prisoner positively. Another man who had been apprehended was discharged by the magistrate. The jury found the prisoner guilty. Mr. Justice BRETT, in passing sentence, said: "A more brutal assault could not be imagined. Here was an old man, defenceless, before five men, who not only knocked him down, but proceeded to kick him about the head, and then threw stones at him. The result of this violence was that the prosecutor was in a dangerous state for upwards of a fortnight, and if he had died prisoner would have been, undoubtedly, convicted of wilful murder, and his life would, probably, have been forfeited. He must undergo seven years' penal servitude." There was a large number of colliers in the gallery, and the sentence appeared to strike them with surprise.

MISCELLANEA.

The Mont Cenis Tunnel.—An official report states that during the second half of July the great Mont Cenis Tunnel made a further advance of 244 feet 10 inches. The length remaining to be pierced at the close of July was 2469 feet; and at the present rate of progress, the tunnel might be completed by the close of the year.

The Metropolitan Under-Ground Railway of London, during the first six months of this year, carried 19,383,584 passengers, and made a total income of £206,809, including freight receipts and payments from other companies for the use of the road and its stations. The dividend for the six months was only at the rate of 3½ per cent. for the year.

"Jacketing" Boilers.—One of the latest of the many plans propose for preventing the radiation of heat from steam boilers consists in applying plaster of Paris by surrounding the vessel or surface to be protected in some cases wholly or in part by an envelope of sheet iron, lead, wood, or other suitable material, placing the envelope at a distance apart from the surface equal to the thickness required for the non-conducting material. The plaster of Paris is then made up in its liquid state and run or poured into the space between the envelope and surface of the vessel until the space is filled. The plaster of Paris in a few minutes solidifies without the application of heat, and the envelope may either remain permanently or be removed after the space is filled.

Mining Tools from Sinai.—W. BOYD DAWKINS, F. R. S., at a late meeting of the Manchester Philosophical Society, exhibited some flint mining tools brought by M. BAURMAN from the turquoise mines of the promontory of Sinai. These mines were worked by the Egyptians from the third to the thirteenth of the dynasties mentioned by MANETHO. Ample evidence was brought forward to show that these stone hammers and chisels were used for breaking up the rock by the miners. Hieroglyphic inscriptions in the neighborhood, relative to these mines, were also evidently cut with similar tools.

Electric Railroad Signal.—The editor of the Titusville *Herald* has inspected an unique and ingenious invention of Mr. ROBINSON, of Pioneer, Pa. It consists of electric wires, so arranged that about a mile and a half or two miles from a crossing, the car wheel will press a wire against the track, completing the circuit and setting a bell to ringing, which continues until the train has passed the crossing, when the circuit is broken and the bell ceases. Again a mile or two from a station, a wire is placed, which is pressed against the track by each wheel and springs up on the removal of the weight. Thus with each completion of the circuit a tap is rung on the bell at the station and the direction, distance, rapidity and length of the approaching train is designated. When a switch or drawbridge is out of place, the approaching train will sound an alarm at the station and throw up a signal, to warn the engineer of of his danger.

An Empire without Inhabitants.—The area of the organized Territories of the United States, including Alaska, is greater than of all the States which have been admitted into the Union. There are nearly a thousand million acres of land in these Territories according to the following table:—

Washington	44,796,160
New Mexico	77,568,640
Utah	54,065,643
Dakotah	96,59 ,128
Colorado	66,880,000
Montana	92,01 ,640
Arizona	72,906,240
Idaho	55,288,160
Wyoming	62,635,068
Indian	44,154,240
Alaska	369,529,600

In all this vast area there are probably not over half a million of white inhabitants. In natural resources this territorial domain is richer than all the area included in the States. The latter contain, say, forty million inhabitants. But here is a a country waiting for for forty million settlers, and even these would hardly be near enough for neighborhood purposes. Railroads will open up the country and bring in population. What a magnificent country to carve into homesteads for forty millions of landless people!—*S. F. Bulletin.*

Steel Spring Motor for Street-Cars.—The following is a description of a new application of steel-spring which has been patented recently by P. E. MCDONNELL, of Chicago:—"In the deivce, coil-springs about twenty inches wide, three-sixteenths of an inch thick, and of suitable length, are placed under the platforms, and by means of suitable gearing their power is concentrated on a shaft, from which it is taken and applied to rotating the journals, the springs uncoiling slowly, but giving a quick rotary motion to the car-wheels. One or both springs may be used, as the case may require, and the gearing may be reserved to move the car in either direction, while a governor regulates the speed. The car is under the perfect control of the engineer, and it can be stopped and started much quicker than when operated by horses; inasmuch as the power required to stop the car is used to stop it, and the inertia acquired in running is used to stop it, very ingenious mechanism being used to accomplish this result. It is expected that an engine will be used at the end of the route to wind up the springs, an operation requiring about two minutes and a half time, and when wound, they are supposed to propel a car five miles, carrying sixty passengers. One great peculiarity in the mechanism consists in the fact that the movement of the car down an incline is made to wind up a spring, which is used to propel the car up grade."

A New Mineral Blue.—A new mineral blue pigment has been invented in France by M. TESSIF DU MOTAY. In shade it is said to resemble ordinary Prussian blue, which, however, it greatly excels in purity of tone as well as in permanency when exposed to light—decided recommendations, if established. The directions given for the preparation of the color certainly looks suspicious; but it is impossible to say that they will not yield the promised result. They are as follows:—"Dissolve separately in water ten parts of tungstate of soda, eight parts of salt of tin, two parts of yellow prussiate, and one part of chloride of iron; then mix the solutions and stir well. Allow the precipitate to subside, then decant the supernatant liquor, and expose the still moist precipitate, spread out in thin layers, to sunlight for three days, during which time the color will gradually change to a pure blue. Then we imagine it has to be well washed to get rid of some soluble matters, after which it can be dried for use. The exact chemical constitution of the color seems to be a matter of dispute. The inventor regards it as a compound of oxyd of tungsten with a double cyanide of iron and tin; while another chemists considers it either a stannate of tungsten or a tungstate of tin. This, though a matter of scientific interest, is of little practical value. Artists are greatly in want of a blue which will compare with real lapis lazuli in purity of tone and stability, and if this color be all that is alleged, the price and composition are of small consequence.

MARKET REVIEW.

The Coal Trade.

NEW YORK, September 15, 1870.

WHOLESALE.—Matters remain in pretty much the same condition as we noted them last week. There is not an active trade doing, but all that can be expected considering the warm weather. Dealers are taking coal in small parcels, thus gradually stocking up so as to be prepared against any accident that may occur. About half of Schuylkill county is out, and we hear of the interference of the transportation of coal via the canals in consequence of the dearth. Lehigh coal is in good demand, and Lump, Egg and Stove are scarce. We are under the impression that coal contracted for during the next three weeks will be bought at the lowest figures this fall, and we consider delays on the part of retailers in laying in stock as dangerous. The retail dealers in and about this city are taking much of their coal now, and our docks and wharves present an active appearance. Of Brooklyn and other adjoining cities the same may be said, and surely the dealers hereabouts have not as much reason to fear being cut off from a supply as those resident inland. The prices of the various good grades of family coals are as low as any reasonable people could desire them, and all these coals are taken as fast as they arrive at our quotations. If there is no interruption to the mining of coal, no interference with its transportation, we see no reason why prices should not remain steady, and believe they will in any of the coals that bear a good reputation in the market. The greatest risk run by dealers is the advance in freights and the difficulty of being supplied just at the time when everybody else wants coal.

RETAIL.—There is a good family trade doing, and our streets are everywhere dotted with carts delivering to families their winter's supply. So many of our housekeepers had to pay $9 and $10 for their coal last winter, that they don't mean to take any chances this year, and are putting it in at from $6 to $7 50.

FREIGHTS.—Vessels are in fair supply, and rates are unchanged.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending September 3, 1870, compared with week ending September 4, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	86,950	2,231,924	100,879	1,866,107
Schuylkill Canal	3,597	253,352	29,542	196,193
Lehigh Valley R. R.	37,504	1,589,042	53,240	2,181,337
Lehigh & Sus. R. R.	14,109	531,230	26,612	684,765
Lehigh Canal	24,213	501,928	25,770	452,021
Scranton North	5,842	223,486	19,452	525,469
" South	13,595	649,996	24,420	1,210,675
Penn. Coal Co., rail	25,312	791,794	21,971	666,291
" " canal	459	13,996	368	12,367
Del. & Hud. Canal Co.	19,106	747,640	45,421	1,564,712
" " R. R.	40	49,498	10,164	319,189
" " south				
Shamokin	9,294	279,685	18,858	316,781
Trevorton	1,945	29,034	2,875	62,028
Lykens Valley Coal Co.	1,276	48,890	5,211	91,979
Wyoming South canal	4,900	190,574	368	12,367
Wyoming North	3,638	28,976		
P. N. Y. C. & R. R. Co.			5,473	384,139
Williamstown, Col'y	6,779	135,669	6,528	204,569
Short Mountain	2,971	73,632		
Big Lick Colliery				
Total	261,530	8,354,425	406,784	10,948,061
1869			261,530	8,355,425
Increase week and year			145,254	2,793,636

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Sept. 10, 1870, compared with week ending September 11, 1869.

COMPANIES.	1870. Week.	1870. Year.	1869. Week.	1869. Year.
B. & O. R. R.	20,000	670,000	23,221	666,009
C. & O. Canal	16,000	407,000	16,961	421,885
H. & B. T. R. R.	7,974	245,646	6,404	212,298
Harrisburg & D.	14,469	252,171	12,672	535,695
L. V. R. R.	....	552	....	9,989
P. & N.Y. C. & R. Co.	....	....	5,984	175,358
	58,263	1,584,419	65,242	1,704,105

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, September 8, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	28,393 05
" Port Clinton	1,149 00
Total for week	29,542 05
Previously this year	166,651 10
Total	196,651 10
To same time last year	2,2,352 01

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Sept. 8, 1870:

From St. Clair	35,314 11
" Port Carbon	5,363 08
" Pottsville	6,477 16
" Schuylkill Haven	33,239 16
" Auburn	6,173 19
" Port Clinton	14,899 19
" Allentown and Alburtis	409 1
" Harrisburgh and Dauphin	12,672 13
Total paying freight	113,551 13
Coal for Company's use	3,673 15
Total for week	117,125 08
Previously this year	2,311,288 14
Total	2,428,414 02
To same time last year	2,876,299 08

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, September 12, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	19,442 18	525,469 06
Shipped South	29,430 19	1,210,675 01
Total	48,872 17	1,736,234 07
For the corresponding time last year.		
Shipped North	5,842 02	223,486 11
Shipped South	13,595 07	649,986 16
Total	19,437 16	873,473 07
Increase	29,436 01	862,761 00
Decrease		

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, Sept. 10, 1870.

	WEEK.	SEASON.
North	45,421 17	1,564,712 01
South	10,164 00	319,189 11
Total	55,585 17	1,883,901 12
Corresponding time in 1869.		
North	19,106 00	147,440 03
South	40 15	49,498 00
Total	19,146 16	196,938 03
Increase North	26,315 17	Increase 817,271 18
Increase South	10,123 04	Increase 269,691 11
Total Increase	36,439 01	Increase 1,086,963 09

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending September 10, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct.	WEEK, 1869. tons ct.	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	27556 19	15389 18	833489 13	530644 19
Upper Lehigh Region	3139 14		160917 15	77488 03
Mahanoy Region	192 13	181 15	1455 04	2436 01
Hazleton Region	8632 08	1623 02	202917 11	116791 08
Beaver Meadow Region	5091 07	5149 03	199807 07	83516 00
Mauch Chunk Region	13819 04	17659 09	83050 09	266142 05
Totals	57831 05	39403 09	1319337 16	1076808 16
Increase	18429 16		242529 00	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	26612 07	14109 13	694765 04	531830 15
Forwarded East of Mch Chunk by Canal	25770 00	24213 09	452021 00	501928 14
Delivered at and above Mauch Chunk	1013 02	930 07	29446 08	23054 18
Delivered to L. & B. R. R. at Plymouth Bridge	4437 16	150 00	143105 07	14843 06
L. V. R. R. at Sugar N.				5151 03
Totals	57833 05	39403 09	1319337 16	107-808 16
Of the above there was transported on acc'nt of L. C. & N. Co.	15744 03	17531 12	102505 15	28?937 05
W.-B. C. & I. Co	16-43 15	6607 06	387919 15	275112 03
Totals	32587 18	24138 18	490425 10	565049 08
Increase	8449 00			
Decrease			74623 18	

Report of Coal Transported over Lehigh Valley Railroad

For the week ending September 10, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	9,254 01	446,949 16	456,203 17
" Hazleton	44,449 01	1,485,350 12	1,529,799 13
" Upper Lehigh	301 19	10,268 08	10,570 07
" Beaver Meadow	16,343 11	535,824 16	556,168 07
" Mahanoy	9,494 03	181,536 01	189,030 04
" Mauch Chunk	32 17	570 03	603 00
Total Anthracite	77,875 12	2,664,499 16	2,742,375 08
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		9,899 00	9,899 00
P. & N. Y. C. & R. R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	77,875 12	2,674,398 16	2,752,274 08
Same time last year	45,336 19	1,777,840 13	1,823,177 12
Increase		896,558 03	929,096 16
Decrease	32,538 13		
Forwarded East from M'h Chunk by rail	58,250 05	2,123,087 07	2,181,337 12
Same time last year	37,564 09	1,531,537 19	1,569,042 08
Increase	20,745 16	591,549 08	612,295 04
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	58,250 05	2,123,087 07	2,181,337 12
To N. C. R. R., at Mount Carmel		2,369 03	2,369 03
Forwarded North from L. & B. Junction	5,473 08	202,827 16	208,300 19
To L. & S. R. R. at Packerton for rail	181 14	5,743 09	5,925 03
Delivered at M'h Chunk	21 08	856 15	878 03
Delivered on line of road above Mauch Chunk	91 09	7,781 09	7,872 18
Delivered above M. Chunk for use of L. V. R. R.	588 07	38,941 14	39,530.01
To L. & S. R. R., at P'n Hav., for railroad			
Do. for canal	7,984 06	187,830 05	195,814 11
At M. Chunk for canal	5,265 00	95,061 18	100,346 18
Total Anthracite	77,875 12	2,664,499 16	2,742,375 08
Bituminous Coal		9,899 00	9,899 00
Total all kinds	77,875 12	2,674,398 16	2,752,274 08

Shipments of Cumberland Coal

for the week ending Saturday, September 10, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	2,105 05	2,157 07	4,262 12
Consolidation	4,153 19	3,089 19	7,242 18
Spruce Hill	434 17	.....	434 17
Midlothian	726 06	550 16	1,277 02
H. and Baltimore	39 07	1,299 18	1,339 05
do Va M	225 17	.....	225 17
V C & I Co	1,282 05	.....	1,282 05
G. C. C. and I	949 19	691 10	1,641 09
Maryland	2,726 14	4,870 09	7,596 14
American	1,221 07	4,308 03	5,529 11
Atlantic	436 07	.....	536 07
Piedmont	1,197 00	.....	1,197 00
Swanton	1,024 05	.....	1,024 05
Barton	784 00	.....	784 00
Potomac	1,624 00	.....	1,624 10
Franklin	1,898 19	.....	1,898 19
Big Vein	2,285 14	.....	2,285 14
Total week	23,221 12	16 961 13	40 183 05
Previous	642,787 18	404,923 16	1,047,711 14
Total year	666,009 10	421,885 09	1,087,894 19

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending Sept. 12, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,473 03	203,308 15	208,781 18
Bituminous	5,984 00	169,374 00	175,358 00
Total, Ant. and Bit.	11,457 03	372,682 15	384,139 18

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Sept. 10, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	25,312 06	791,794 14	21,971 18	666 291 08
" Canal	459 13	13,996 08	358 18	12,367 08
Total	25,771 19	805,791 02	22,330 17	678,678 16

Increase, 1870, 127,112 06 tons.

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, September 10, 1870: 6,528 15

Same time last year	6,779 02
Decrease, Tons	250 07
Total amount shipped to date	204,569 00
Same time last year	135,669 07
Increase, Tons	68,899 1

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Sept. 1, 1870:

	Tons.
For week	12,672 13
Previously this year	523,023 03
Total	535,695 16
Same week last year	14,469 13

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, September 9. R. A.	W. A.	AT PHILADELPHIA, September 9. R. A.	W. A.
Lump	$—	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 75 to 6 50	5 50 to 6 00	— —	4 50 to 4 75
Stove	5 75 to 6 50	5 50 6 00	— —	4 50 to 4 75
Chestnut	4 50 to 5 60	6 25 6 75	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side) cpd	6 10	— —	— —	— —
Broken	5 85	— —	— —	— —
Egg	5 85	— —	— —	— —
Stove	6 10	— —	— —	— —
Chestnut	5 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 50	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	6 25	— —	— —
Honey Brook, Le'h	W. A.	4 75 to 5 75	— —	— —
Spring Mountain	"	4 75 to 5 75	— —	— —
Sugar Creek	"	4 75 to 5 75	— —	— —
Sugar Loaf	"	4 75 to 5 75	— —	— —
Old Comp'y's.	"	4 75 to 5 75	— —	— —
Cross Creek	"	4 75 to 5 75	— —	— —
Enterprise	"	— —	— —	— —
Girardville	"	— —	— —	4 75
McMichael	"	— —	— —	4 75
Shamokin	"	5 50	5 25	— —
Lykens Valley	"	— —	5 75	— —
Broad Top	"	5 50	— —	— —
Hill & Harris	"	— —	4 75	— —
Henry Clay	"	— —	5 00	— —
Powelton	"	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein	f.o.b. at Phila.	$5 00
Lemon	" "	4 75
Cumberland Vein Coal		4 75
Cumberland C. & I. Co.'s on board	N. Y.	7 00
Maryland Coal Co.	"	7 00
Consolidated Coal Co.'s	"	7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 60	4 75	4 25	5 25	5 75	4 75
Pittston at Newburgh	5 00	5 00	5 20	5 30	5 50	4 70
Lackawana at Rondout	4 50	4 60	4 90	5 00	5 50	4 50
Wilk'b're at Hoboken	4 75	4 75	5 25	5 25	5 75	4 75
Old Co. Lehigh at Pt. Johnston	6 25	6 00	6 00	6 00	6 25	5 25
Lehigh at E. Port	5 75	5 50	5 50	5 50	5 75	4 75

For freights to different points, see "Freights."

Prices at Baltimore—September, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$4 30@5 50
Pittston and Plymouth, do	5 00@5 25
Shamokin Red or White Ash, do	5 50@6 00
Lykens Valley Red Ash, do	5 40@5 50
Broken Valley	25 5a—
By retail, all kinds per ton of 2240 lbs	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point	5 35@5 50

Prices at Georget'n, D.C., & Alexandria, Va.

September, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes ..$— —@— —
Lykens Valley — —@— —
Shamokin Red or White Ash — —@— —
Trevorton and Zerba Valley — —@— —

Prices of Gas Coals.

September, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.

	Duty, $1 25, gold. Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton $7 80

Prices of Foreign Coals.

September, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House	13 50@15 50
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon $2 00
Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 84
C. R. R., N. J., Easton to Elizabethport	1 27
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 46

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 84
C. R. R., of N. J., Easton to Pt. Johnson	1 34
Shipping expenses	25
Warfage	10
Total	$2 53

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 84
Morris & Essex R. R. Easton to Hoboken	1 34
Shipping expenses	25
Warfage	10
Total	$2 53

TO SOUTH AMBOY.

L. V. R. R.	84
R. & D. R. R.	1 14
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	84
C. RR. of N. J. Easton to Elizabethport	1 27
Shipping expenses	25
Wharfage	10
Total	$2 46

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven $1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris "	1 10
Freight	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 00
Freight	
	2 40
For re-shipment	2 20
Total	$4 60

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	1,03
Freight	55
Total	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	60 00
Mamaroneck	70 00
Glen Cove	60 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

	Boats of 150—250 Tons. Per Ton.
To Manhattanville	8 cents
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	10 "
Dobbs' Ferry	12 "
Nyack	14 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	23 "
	Boats of 100 Tons. Per Boat.
To Manhattanville, and Return	$11 00
Spuyten Duyvil	13 00
Yonkers	15 00
Sing Sing	20 00
Peekskill	25 00

Freights.—SEPTEMBER, 1870.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnston.	From Newburg	From Rondout
Amesbury	$2 50	$2 15	$	$
Bangor	2 80	1 80	1 60	
Bath	2 75	2 00	— —	
Boston	2 50	1 90	2 25	1 90
Bridgeport	1 60	1 00	1 10	1 20
Bristol	2 30	1 40	1 40	
Cambridgeport	2 50	1 40		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 90	2 30		
Fall River	2 30	1 40	1 40	
Hackensack	1 75	1 50		
Hartford	2 50	1 35		
Jersey City	1 35 to 1 55	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 35	1 40		
Newburyport	2 50	2 10		
New Haven	1 70	1 00	1 10	1 20
New London	2 00	1 20	1 25	1 30
Newport	2 30	1 40	1 40	
New York	1 35 to 1 50	1 60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 50	1 25	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 70	1 75		
Portsmouth, N. H.	2 90	2 10		1 85
Providence	2 30	1 40	1 45	1 45
Rockport	2 10	— —		
Saco	2 75	2 10		
Sag Harbor	1 70	1 40	1 30	
Salem	2 50	1 90	2 25	2 35
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	2 00		
Warren	— —	1 40	1 45	
Washington	1 50			
TO RIVER PORTS.				
Albany		90	60	
Catskill		— —	50	
Cocksackie		— —	50	
Coeyman's		— —	75	
Cold Spring		— —	35	
Fishkill		— —	30	
Haverstraw		50	60	
Hudson		— —	50	
New York		— —	70	
Nyack		60	60	
Poughkeepsie		— —	25	
Rhinebeck		— —	30	
Rondout		— —	— —	
Sangerties		— —	40	
Sing Sing		— —	75	
Stuyvesant		— —	55	
Tarrytown		80	75	
Troy		90	75	
West Point		— —	35	
Yonkers		40	60	

Foreign and Provincial Freights.

September, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-2 tons	£14 00@£16 00
Liverpool	12s. 6d@14. ton
TO NEW YORK.	
Provincial	
Sidney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—
TO BOSTON.	
Sydney	$—
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

METALS.

NEW YORK, September 17, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1¼ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	31 00@35 00
Pig, American, No. 1	33 00@34 00
Pig, American, No. 2	30 00@31 00
Pig, American, Forge	27 00@29 90
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@110 00
Bar, Refined, " " "	80 —@ 85 00
Bar, Common, " " "	75 00@ 80 00
Scroll, " " "	97 50@130 —
Ovals and half-round, " " "	100 —@125 —
Band, " " "	95 —@ — —
Horse Shoe, " " "	95 —@ — —
Rods, ⅝ to 3-16 inch, " " "	85 —@120 —
Hoop, " " "	105 —@150 —
Nail rod, less 5 ₱ ct.	7@ 7½
Sheet, Russia, as to Nos. (gold)	— 11@—11½
Sheet, Single, D. and T Common	— 5@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₱ ton	59 00 @60 00
Rails, American, at Works in Pa.	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 centsore lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (St prices.)

English Cast (2d and 1st quality) ₱ lb	—	15	@— 18
English Spring (2d and 1st quality)	—	7	@— 10
English Blister (2d and 1st quality)	—	10	@— 17
English Machinery	—	11½	@— 14
English German (2d and 1st quality)	—	13	@— 15
American Blister "Black Diamond"	—	—	@— 12
American, Cast, Tool do.	—	—	@— 18
American, Spring, do.	—	9	@— 11
American Machinery, do.	—	—	@— 12
American German, do.	—	9	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 30
Copper Braziers, 16oz. and over	— @— 30
Copper Nails	35 @— 36
Copper, Old Sheathing, &c., clean	— @— 19
Copper, Chili Pig	— @— —
Copper, American Ingot	20¾@— 21
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2½ cents ₱ lb.

Galena, ₱ 100 lbs.	$—	@—	—
Spanish (gold)	6 32½	@6 37½	
German, do.	6 20	@6 87½	
English, do.	6 37½	@6 62½	
Bar (net)	8 25	@8 50	
Pipe (net)	— —	@8 25	
Sheet	8 25	@8 55	

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	37 @37½
Straits	36 @36½
English	32½@32½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency.*
I. C. Charcoal, ₱ box	$8 75 @9 —	$10 25 @11 75
I. C. Coke	7 50 @8 —	9 25 @ 9 75
Coke Terne	6 00 @6 75	7 25 @ 8 00
Charcoal Terne	7 75 @8 —	9 50 @ 9 75

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100lb

	Gold.
Plates, Foreign ₱ 100 lbs.	$6 32½@ 6 35
Plates, Domestic ₱ lb.	08½@- 11½

REMARKS:

IRON.—There is only a moderate demand for Scotch Pig, but as holders are not offering their stocks freely, prices are a little firmer; the sales are 200 tons Carobroe at $32; 250 do. Eglinton, from yard, part $32 50; and 100 do. Gartsherrie, on private terms. There has been a little more inquiry for American, and prices remain firm—640 tons No. 1 Allentown sold at $33; 200 do. Crane, $33; and 100 do. Gray Forge, on private terms. Wrought Scrap continues in request at full quoted rates, and we notice sales of 1,000 tons, part to arrive, at $37. There is a good inquiry for Rails, and prices generally are maintained—250 tons American sold at $70, at the mill; 775 do. old T, part about $80, gold; and 300 do. old Double-headed, on private terms. Refined Bar from store continues in the same unsatisfactory condition as to demand and price that we have been called upon so frequently to notice; the demand is moderate, and prices are too low to leave any profit. The mills in Philadelphia and Pittsburg have almost no stocks, much time having been lost in consequence of the heat of the summer preventing the men from working and the makers from filling their orders; prices there are higher than here, yet the mills are full of orders. We note a sale of 400 packs Russia Sheet, old stock, at 11 cents, gold. The total shipments of Russia Sheet the present season to New York and Boston will amount to about 6,000 packs, against shipments last season of 30,900 packs; it may be remarked here that Sheet is much less used than formerly in making stoves, Cast Iron having almost superseded it for this purpose; we quote 11 @ 11½ cents, gold.

LEAD.—Pig continues dull, but prices are without change. We have only to notice a sale of 50 tons Spanish at $6 50, gold. Bar is quoted 8¼ @ 8½ cents; Pipe, 8¼, and Sheet $8 25 @ $8 55, net cash.

COPPER.—New Sheathing and Yellow Metal are steady at 30 and 22 cents, cash. The demand for Ingot has been moderate, but the market rules very firm, and closes with an upward tendency. The sales embrace 300,000 to 400,000 lb., at 20¾ @ 21 cents for both Lake and Baltimore; and 25,000 lb. Detroit, 21¼, forward delivery.

TIN.—Notwithstanding the favorable European advices noticed in our last, Pig continues quite as dull as before; 775 to 800 pigs Straits sold in lots at 35¼ cents, which is a nominal quotation, and small lots English within our range, say 32¾ @ 32½, gold. Plates are steady, with further sales of 1,000 bxs. Charcoal ¾d X and extra on private terms.

SPELTER.—Foreign continues in limited demand, and prices still have a softening tendency; 20 tons Silesian sold at $6 32½ @ $6 35, gold, and 10 do. Stolberg, on private terms.

STEEL.—Prices are steady, and the demand is fair.

ZINC.—Am. Oxide, 6½ @ 7; French do., 10½ @ 10½; Sheet do., 10 @ 10½.

MANGANESE—4 @ 4½ cents.

Mining Stocks.

NEW YORK, Sept. 16, 1870.

Business at the Mining Exchange continues light with the advanced prices of last week well sustained. We quote:

	Bid.	*Asked.*
Bates and Baxter	15	—
Benton Gold	5	6
Black Hawk Gold	25	40
Central Gold	18	—
Consolidated Gregory	75	85
Grass Valley	25	30
Gunnell Gold	17	—
La Crosse Gold	10	—
Liberty	1	02
Quartz Hill	20	23
Raymond's Forks	—	75
Smith & Parmelee Gold	60	90
Manhattan	50	—
Minnesota	—	—
Wa kill	3	—
Walkill assented	5	—
Rutland Marble	—	25 00
Lehigh and Sus	1 00	—

The following are the prices of Petroleum stocks, as reported at the Mining Stock Board:

	Bid.	*Asked.*
Bennehoff	25	40
Bergen Coal and Oil	40	—
Blood Farm	50	—
Buchanan Farm	45	—
Central	54	65
Home Petroleum	1 00	—
N. Y. and Alleghany	1 75	—
National	10	—
Northern Light	—	75
Pithole Creek	1 10	1 25
Phillips	15	25
Rathbone	—	40
Rynd Farm	28	38
Second National	—	75
United Petroleum Farms	15	—
United States	—	75

San Francisco Stock Market.

(By Telegraph.)

PER SHARE.	Sept. 4.	Sept. 13.
Savage	38	40½
Crown Point	6	55½
Jellow Jacket	28	28
Kentuck	37	45
Chollar Potosi	47	—
Gould & Curry	115	144
Ophir	6	—
Alpha	4	—
Belcher	3	2
Imperial	23	27
Hale & Norcross	88	—
Ama or	—	230
Empire Mill	1	—

The Slate Trade.

NEW YORK, Sept. 16, 1870.

This week we present to our readers the first installment of slate shipment reports from the Vermont region. It will be noticed that a part of what is known as the *Vermont* slate region extends into the State of New York. Our report is from our correspondent at Middle Granville, who, to make the table as complete as possible, includes in it returns for July and August.

Below we give a few items of interest relating to the Eagle quarry, which did not reach us in season to insert with the others last week.

Our special correspondent in Vermont also gives us a few notes relating to the marble interest at Sutherland Falls.

Below will be found our corrected quotations of slate in this market.

Eagle quarry is now working about 80 men, all told, though at times they have had as many as 260 in the quarry and mills. The average yearly product of the mill is about 120,000 feet of stock, in mantles, billiards, blackboards and tiling. On account of the dull times, the product of roofing slate for the present year will not run above 4,000. In past years, however, the annual production has gone as high as 18,000 squares. Dressing machines are largely used in finishing up roofing slate. The saving made by these machines is very great. We were told by Mr. Goss, the Superintendent of the quarry, that by the use of them one boy can dress as many slate as four men working in the old way.

In working the quarry channelling is the only method employed in getting out the stock. Gunpowder is being abandoned everywhere, as destroying stock to such an extent that it costs more than the cutting of the channels by hand. Within a few years many machines for getting out the slate have been tried, but as yet nothing has been produced sufficiently light, durable and convenient for the purpose. Several parties, however, are at work on the problem, and before long will have machines at work much better suited to the labor than anything previously tried.

The quarry itself is an object of interest, being the largest in the States, and quite peculiar in its mode of working. The first opening is perhaps 580 feet long, some 100 feet deep, and 100 wide. This was the original excavation, and went down 85 or 100 feet. From the bottom of this tunnels or inclines have been put into the slate, which here dips at an angle of 30°. The total depth from the bank to the bottom of the tunnel is about 600 feet.

The hoisting is all done by means of wire ropes with traversing pulleys.

The beds or layers of slate in the quarry are in all some 20 feet thick. The first is a layer of green, eight feet thick; below this is a stratum, about 18 inches thick, called the intermediate, and is of neither green nor purple color. Below this is the "four-foot" purple bed, which contains some of the best stock in the quarry, and below this the "eight-foot" bed of purple. The quarry is now about 250 feet in depth, measured in a perpendicular. At the present time work is going on in pushing tunnels south without going any deeper.

SUTHERLAND FALLS

is situated on Otter creek, some six or eight miles from Rutland. The river here has a great fall, which furnishes most valuable water-power. If we are not mistaken, this is second in value only to the falls of the same river at the city of Vergennes, Vt. The latter is the finest water-power in the State. There is only one quarry at Sutherland Falls; yet, on account of its peculiar character, it deserves special attention. The marble here is extremely hard and of a dark color. What is known as the "Dark Mourning vein" is entirely different from anything found elsewhere. The color of the darker kinds is a pure dark grey, banded with black or a color nearly approaching it, which makes it very appropriate for work in cemeteries. It is not only hard but exceedingly durable, equalling in this respect our very hardest and most enduring building stone. The layers in the quarry are so firmly united that the stone is nearly if not quite as sound in the seams between the layers as in the layers themselves. Here channelling engines are used both for the length and width of the blocks, making the greatest possible saving of the material, a very important point here, where the stone is exceedingly valuable. It is, as a rule, worth a higher price than any other marble in this section, excepting, perhaps, choice statuary. There are two mills at this place, driven by water-power and running in all 22 gangs of saws. About 100 men are employed here. Messrs. DORR & MEYER have one mill which they have built here recently; the other is owned by the Sutherland Falls Mining Company. Only one mill is running at the present time. Much Brandon marble was formerly sawed at these mills, which are situated close to the Rutland Railroad track, making shipment of course very easy. Other quarries in the vicinity are being prospected, with what results we are unable to state, but so far this marble stands unrivalled.

Prices of Slate in New York.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50	@ 7 00	
" green, 1st " "	6 50	@ 7 00	
" red, 1st " "	15 00	@16 00	
" variegated, " "	5 75	@ 6 25	
Pa. b'k and d'k blue, 1st qual., "	7 00	@ 8 00	

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending September 10, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	July.	Aug.
Penrhyn Slate Co.	465	1,305	1,680
New York Slate Co.	2,400	25	....
Middle Granville Slate Co.	....	97	264
*American Slate Co.	....	....	....
Benj. Williams	120	202	3.6
Jones & Williams	....	....	....
Eagle Slate Co	....	148	5
H. W. Hughes	40	....	....
Total	3,025	1,777	2,255
Total for year as far as reported			7,057

* Penrhyn and American Co.'s shipments are consolidated for this season.

MILL STOCK.

NO. OF CASES.	Week.	July.	Aug.
Eagle Slate Co	3 cars.	1 car.	1 car.
Penrhyn Slate Co.	.....	.	.....

MANTELS, &C.

NO. OF CASES SHIPPED BY	Week.	July.	Aug.
Eagle Slate Co.	cases		
Penrhyn Slate Co.	" 130	284	457

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending September 10, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	105 squares.
Locke Slate Co.	175 "
Girard Slate Co.	175 "
American	105 "
Kuntz & Woodring	70 "
Saylor & Morgan	70 "
D. Thomas	70 "
Lehigh Slate Co.	70 "
Columbia Slate Co.	35 "
D. Williams & Co.	35 "
Total	910 "

SCHOOL SLATES.

A. W. Lerch	2 cases.
D. Williams	71 "
Locke S ate Co.	87 "
Lehigh Slate Co.	45 "
Total	205

BLACK BOARDS.

Lehigh Slate Co.	15 cases.
Yerkes & Martin	9 "
Total	24 "

MANTLES.

Lehigh Slate Co	28 cases.
Yerkes & Martin	20 "

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Heimbach Slate Co.	105 squares.
Twin City Slate Co.	35 "
Philadelphia Slate Co.	70 "
Eagle Slate Co.	70 "
J. L. Patton	35 "
T. J. Thomas	35 "
National Slate Co.	35 "
Thomas Kuntz	35 "
Total	390 "

SCHOOL SLATE.

A. W. Lerch	169 cases.

	Week.	Previously.	Total for Year.
L. and S. R. R.	390	6,102	6,492
L. V. R. R.	910	14 452	15,362
Lehigh Canal	...	2,454	2,454
Total	1 300	23,008	24,308

The Folly of Strikes.

STRIKES are of English origin, having been introduced into this country within a comparatively recent period. Experience has not only demonstrated their folly, but their absolute wickedness in most cases. A little more than four months ago the miners in the Schuylkill coal region struck for higher pay, and after a fruitless, exhaustive and expensive contest for the whole of that time, were finally obliged to recede from their demands and accept work at former terms, but leaving them in a far worse and more dependent condition than ever. There was a host of small owners and limited operators who stood as mediators between the miners and heavy capitalists, and whose good offices were frequently invoked by the miners. It was as much in compliance with the urgent remonstrances of this middle class as from any other cause, that heavy operators have frequently made notable concessions to the miners. The recent strike was, however, of not long continuance, and the operatives were so unreasonable in their demands that the middlemen have been swamped, and their interests bought at low figures by rich capitalists, who could afford to leave their mines unworked until the miners were starved into submission. This end has been achieved, and the operatives have only succeeded in killing off their best friends and riveting the yoke about their own necks. The miners have imposed upon themselves such humiliating conditions, that if they had been proposed by their employers the community would have regarded them as insufferable tyrannies. In accepting last year's basis of wages, they passed the following extraordinary resolution:

"Any miner earning, above expenses, over $100 and less than $125, shall be reduced 10 per cent. on the basis. Earning over $125 and under $150, shall be reduced 20 per cent. on the basis. Earning over $150 and less than $200, to be reduced 30 per cent. on the basis. Earning over $200, to be reduced 40 per cent. on the basis."

In accordance with these conditions, each miner binds himself not to earn more than $100 per month, virtually intimating that it would be improper for an operative to better his condition beyond that amount, and offering a premium for downright indolence. A smart, active, industrious and intelligent man is yoked to a lazy, idle, worthless fellow, who has no ambition himself, and seeks to restrain it in others. This is a fair specimen of the average intelligence shown by strikers generally. In nine cases out of ten, when operatives do not receive a fair recompense for their services, a clearly-stated and well-considered remonstrance will suffice to insure the required alleviation. The principle which has been insidiously engrafted into the minds of operatives that capital is necessarily at war with labor, is not only erroneous but exceedingly mischievous. The employer who does not seek to have his employees take an interest in his success, who fails to invest them with some degree of zeal and desire for his business prosperity, is a natural ass, and must sooner or later experience the results of his folly. Capital does not war against labor. It maintains, employs, pays it. Labor has been made to act as its own enemy. It has passed resolutions lowering its standard and debasing its dignity. It has ruled out and tabooed its own class, and taken up arms against its protector and employer. It has arraigned itself against capital, starved out thousands of operatives, and crushed small operators without the slightest accruing benefit. The rigorous winters which prevail at the East necessitate the use of fires for months together. Rich people can afford to purchase fuel at any price; but the blows fall heavily on the poor, and they are the persons on whom strikes invariably take effect. Nine-tenths of Eastern manufactures are carried on by steam raised by consuming coal: but when the price of coal is doubled or trebled by strikes among the miners, manufacturers are compelled to close, or curtail their business, throwing thousands of operatives out of employment, and inflicting widespread distress, which reacts upon the strikers. The injury which might be inflicted upon every interest in the community has no place in their economy.—*California Commercial Herald.*

Annealing Metals.

According to the invention of Mr. J. M. BOTTUM, of London, England, an annealing pot of any common or suitable form is employed, within which the metal to be annealed may be packed in charcoal or other material, and the whole introduced into the furnace for heating in the customary manner. When the heating is completed the pot is removed from the furnace and placed in the improved cooling chamber, which is then closed air-tight until the gradual cooling of the metal within the annealing pot is finished. The annealing pot during this process is preferably supported at a considerable distance from the external walls of the chamber, and the cooling chamber itself is preferably supported in such a manner as to lessen or avoid any unequal conduction of heat from its various parts.—*Mining Journal.*

Fair Yield.

One hundred and seventy-three pounds of ore from the Conquest ledge, Arizona, produced $9 30 in gold, being a result equivalent to $107 50 per ton. This ore was worked at the Newark Refinery. The ledge is one of the best known in Arizona, and is here seeking capital.

Origin of Gold Nuggets and Gold Dust.

By ANDREW MURRAY, F.L.S.

[From the London Scientific Opinion.]

THE origin of gold nuggets and gold dust is not so simple or clear as at first sight it appears to be. The natural explanation of the production of gold dust is, that it is the golden portion of the *debris* of rocks, which have originally had gold disseminated through them. As the wear and tear of ages has crumbled into dust mountains so composed, part of the dust becomes sand, or quartz, or whatever else the basis of the rock may be, and the other part is the liberated gold, from which the quartz has been rubbed away ; and if we accept this as the explanation of the production of gold dust, the same hypothesis should explain that of gold nuggets, which are found associated with it. But there are various circumstances which it is difficult to reconcile with this theory. One of these is the occurrence in the drift of nuggets of a larger size and less intermixed with foreign substances than have yet been discovered in any quartz reef ; as most people are aware, the gold in reefs is usually disseminated in particles and strings through the quartz veins or rock, instead of lying in pockets or masses. Another still more remarkable fact, applicable both to gold dust and gold nuggets, is that alluvial gold is generally of a higher standard than that obtained from the reefs. It is needless to say, that if it is merely the gold washed or crumbled out of these reefs, it ought to be of identically the same standard and quality. Another objection to the dust being merely the degraded particles released from the rock, is the size of the particles—not nuggets, but particles of dust. Gold being so much softer than quartz, its particles, after being subjected to the same degree of attrition, ought to be vastly smaller ; although of greater toughness than quartz, and possessed of ductility and tenacity, which quartz wholly wants, it is very soft, and, under the influence of the attrition from running water and its accompaniments, ought to be pounded and torn into the minutest fragments ; but this is not so. There is, moreover, a marked difference in the appearance of the gold dust from different drifts in different countries. In some it is like dust or sand, in others it is like scales. If subjected to the same influences in all, there seems no reason why the same shape should not obtain in all cases.

These peculiarities would suggest that some other influence than mere degradation of gold-charged rocks has been the agent in producing gold dust ; but in any and every view, we think it cannot be disputed that degradation must have had some share in the work. It is plain that, if a gold-charged rock is reduced to gravel, sand, or powder, particles of gold, of some size or other, or gold in some shape or other, must form part of the *debris*. These gold remnants should be found in greater quantity, and in greater size, the nearer they lie to the source from which they were drawn ; and this we believe also to be the case. The general similarity between gold-producing districts, by which a Californian miner could detect a likely spot for gold in Australia or Kildonan, probably depends rather on the character of the mountains out of which the gold has come than on the mode of production of the manufactured dust, if we may call it so. We imagine that the truth will be found to be that the result is referable to two causes, only one of which may in some cases have been present, in others, both ; the first, the ordinary process of degradation and grinding the rock to fragments ; the other, as suggested by Mr. SELWYN, the Government geologist of Victoria, that gold has also been taken up in solution by the water permeating the gold-bearing rocks, and that in passing through the drift, in which minute particles of gold lay, it has from some cause become decomposed, and the gold held in solution been precipitated and deposited around the most congenial *nuclei* presented to it, which would undoubtedly generally be the particles or pieces of reef gold, or any other metallic substances for which it had an affinity.

We find an interesting paper on this subject in the "Transartions of the Royal Society of Victoria," (1867,) by Mr. C. WILKINSON, in which he mentions some facts bearing on the subject. It appears that Mr. DAINTREE, formerly of the Geological Survey of Victoria, had on one occasion prepared for photographic uses a solution of chloride of gold, leaving in it a small piece of metallic gold undissolved. Accidentally, some extraceous substance, supposed to be a piece of cork, had fallen into the solution, decomposing it, and causing the gold to precipitate, which made a deposit in the metallic state, as in the electro-plating process, around the small piece of undissolved gold, increasing it in size to two or three times its original dimensions. Considering this accidental experiment of Mr. DAINTREE's, as in some measure supporting Mr. SELWYN's theory, Mr. WILKINSON followed it up by a few simple experiments in the same direction, which he details in his paper. In his experiments, a small chip of wood was generally used as the decomposing agent. In one instance he used a piece of leather. All through the wood and leather gold was disseminated in fine particles, and, when cut through, the characteristic metallic lustre was highly reflected. From various experiments, it would appear that organic matter is the necessary chemical agent for decomposing a solution of the chloride of gold in order to precipitate the gold as a coherent coating around a nucleus ; and that, so far as Mr. WILKINSON had yet tried, iron, copper, and arsenical pyrites, galena, antimony, molybdenite, blend, wolfram, and metallic gold, constitute essentially favorable *nuclei* to determine this chemical reaction. It is to be observed, too, that organic substances, such as fragments of wood, roots of trees, etc., occur abundantly in the gold drifts of Australia. If water holding gold in solution circulates through the rocks and drifts, all the conditions necessary for the production of gold dust and nuggets by deposit are present. Does the water so circulating now hold gold in solution ?

One would think it would not be difficult for a chemist in Australia or California to determine the fact by direct experiment, but it does not appear that it has ever been tried. Mr. C. WILKINSON, however, quotes facts which lend probability to the view that when the trial is made the question will be solved in the affirmative. In testing a solid mass of iron pyrites M. DAINTREE found gold throughout. The mass retained the structure of a tree-stem, in which the organic structure was replaced by pyrites. It had been taken from the Ballarat drift, and the same experiment was repeated by Mr. NEWBURY, the geological survey analyst, on another stem taken from the same drift, with a like result. Gold in such deposits assumes a mammillary form, which appears analogous to that presented by the surface of nuggets—a point of some importance, for, in the first place, it is a question whether a mammillary surface is the kind of surface that would be produced by abrasion and attrition ; and, in the next place, abrasion or attrition can certainly have nothing to do with its appearance in these golden petrifactions. We cannot avoid attaching the greatest importance in relation to the question, to the presence of gold in pyrites that has been formed in wood imbedded in auriferous drifts. The gold *must* have been in solution when so deposited, and everything will then depend on the age of the so petrified wood. If contemporaneous with the drift, the question is answered. Another fact to the same effect is, that sometimes gold incloses a nucleus of brown iron, etc. This is obviously quite inconsistent with such pieces of gold having been abraded, as they are out of crumbling rocks ; such nucleated pieces of gold are never found in reefs. It is the old puzzle of a reel in a bottle. In relation to this we may remark that we believe that nuggets have never been found in the gold fields of Brazil. We have the authority of Mr. HARDING (a gentleman well known for his great practical knowledge of gold mines and mining in that country) that he never met with nor heard of a nugget, properly so called, in all his many years' experience in the gold district of Brazil ; but, on the other hand, it is there almost invariably found in veins in connection with, or in the vicinity of some other metal—generally iron. In what is probably the most prolific mine of gold that has ever been known in the whole world, that of San Juan del Rey, (the value of which was not long since so seriously depreciated by the accidental destruction by fire of the wooden ladders, supports and machinery) the gold is found in a matrix of porous iron or agglutinated iron sand, called Jacotinga, which consists of a bed or vein not a foot in width, but so incredibly rich that on one occasion, when our informant was on a visit to the manager, there was brought in on an assiette, as a sort of dessert for the eyes after dinner, a lump of gold ore that had been extracted that day from the mine. It was about the size of a large fowl ; not so big as a turkey, but bigger than a duck. It was a mass of Jacotinga iron, with gold all mingled and streaked through it. The gold, when afterwards extracted, was found to amount to 30 pounds weight. On the previous day the amount of gold obtained from the Jacotinga had been 67 pounds, and on the day following 130 pounds, equal in value to about £8,000. We only mention it as a corroborative instance of the concurrent presence of gold and iron. Lastly, as pointed out by Mr. WILKINSON, it must be admitted that the fact that gold may be greatly purified by dissolving and re-precipitating it, is very suggestive of the generally higher standard of alluvial over-reef gold being due to a similar cause.

The Application of the Hot Blast to Blowpipe Purposes,

AND THE PROPOSED SUBSTITUTION OF HEATED AIR FOR OXYGEN IN THE PRODUCTION OF CERTAIN THERMAL AND ILLUMINATING EFFECTS.

By W. SKEY,

Analyst to the Geological Survey of New Zealand.

THE useful and well-known effects of the hot blast, in the process of iron smelting, has induced me to try and extend it profitably to other purposes, beyond that which prompted its application in the present instance. My experiments, as yet, have been confined to testing the effects of substituting a hot blast for a cold one, as hitherto used, for the production of the well-known blowpipe flame ; a flame so produced will be expected to have its thermal and illuminating effects augmented, but scarcely, perhaps, to that degree which experiment has demonstrated. I had better state, at the outset, those particulars which it is necessary to know, before relating the results. The temperature of the blast was, approximately, 500° Fahrenheit ; the diameter of the jet, regulating its issue, was 1-30th of an inch ; the combustible for receiving the blast was stearine. T. is flame manifested a very marked superiority over the common blowpipe flame—substances difficult to fuse in the latter, magnetite, potash-felspar, mica, readily yielded under these circumstances ; while thick glass tubes, half an inch in diameter, and hard German glass tubes, were tractable to an eminent degree. Carrying my test experiments still further, I found several substances, for the fusion of which the oxyhydrogen flame, or some equivalent of it in heating power, is said to be indispensable, also yielded before the blow-pipe-flame thus urged : for instance, platinum, pipe-clay, fire-clay, agate, opal, flint. Several samples of each were tried, and always with the same results ; it could not well be, therefore, that the fusibility of any of these substances was due to the accidental presence of foreign matter, in more than usual quantity. The platinum was the common platinum foil, also a sample prepared especially for the purpose ; the only impurity found in it was iron, as traces, communicated to it in the act of forging ; possibly minute quantities of some of the other metals of the platinum series might be present, but they would rather tend to increase its infusibility than otherwise. Alumina only appeared to vitrify ; while, after numerous trials with crystallized quartz, I could not succeed in fusing it to a globule ; thin splinters, however, curled round upon themselves, like scolezite, and ultimately assumed a glazee appearance, clearly showing that the melting-point was all but reached. It appears, from this, that a very small amount of some foreign substances exercises a marked effect upon the fusibility of silica, agate, opal, etc., eing only a little less pure than rock crystal, though so readily fusible in this flame. Regarding the illuminating power of the flame so produced, when allowed to impinge upon a solid substance, such as lime or magnesia, it was not only more intense (as would be expected), but the volume of incandescent matter was largely increased. Before I proceed to urge the further use of hot air for combustions, where high temperatures are necessary, I wish to call attention to the fact, that the temperature of the flame, which I have hitherto worked with, can be largely and economically increased by increasing that of the blast ; this can easily be done to a threefold extent. By substituting heated hydrogen (or burnt coal-gas), I have also realized all the effects just instanced, with greater rapidity and decision ; but the great diffusiveness of this gas, especially when heated, has prevented me, as yet, carrying the experiments further.

While on the subject of heating both combustibles (at least, both the substances which take part in these combustions), I cannot refrain from remarking how easily the temperature of the oxyhydrogen flame, even, could be increased in this manner—the gases would, of course, have to be heated prior to contact. Upon their more vigorous diffusiveness, when rarefied, I should rely for that solidity of flame so necessary where the communication of very high temperature is desired. The jets regulating the issue of the gases would have to be very fine. Proceeding now to the next part of this subject : the result of these experiments, instanced, urge me to recommend, for trial, the substitution of heated air for oxygen, in most of those cases where this gas is now employed in conjunction with hydrogen or other combustible matter, as a generator of heat or light : for instance—1. In the metallurgy of platinum, that part of it where the metal has to be fused ; also in soldering platinum stills for sulphuric acid works. 2. The fusion of alumina in the manufacture of certain gems. 3. In the production of the Drummond and Bude lights. The fusion of platinum and alumina is now effected by the oxyhydrogen flame. Relative to the competency of heated air to perform the part of cold oxygen in the production of such intense lights as these (the Drummond and the Bude), I think this can be demonstrated, almost to a certainty, in the following way :

Thus—the flame employed in these investigations has certainly a minimum temperature of 4555° Fahrenheit, since this is the fusing point of platinum, the substance most easily fused of all those I have tried that are infusible in the common flame ; doubtless the temperature is considerably higher, but I will take these figures. On the other hand, the actual temperature of the lime, when the Drummond light is in operation, is (on the authority of TYNDALL) only 2000° C. = 3632° Fahrenheit ; hence this flame has an excess of temperature over that of the incandescent lime equal to 964° Fahrenheit, a pretty good margin for loss, surely sufficient if properly economised ; but as I have already shown, this excess of temperature can be largely increased. In view of the greater controllability of the proposed substitute, the absence of all danger in its use, its not requiring chemical preparation, and its cheapness, compared with oxygen ; upon these several points, respectively, the question should be properly tested. Besides the substitution of oxygen urged above, the possible fusion of the purer clays and certain silicas, etc., in a ready and economical manner, may induce the further utilization of these substances, while, in experimental chemistry, the facility with which such high temperatures can be attained and kept up may lead, among other things, to some cheaper way of extracting certain metals from their oxydes—aluminium, for instance, from alumina or clay.

On reviewing these results, it does seem not a little singular that a difference of not more than 500° Fahrenheit in the temperature of the blast should make the difference between the fusibility and infusibility, of such substances as platina, agate, fire-clay, etc., in the blowpipe flame. It will be recollected, however, that the blast has, in this case, not only taken up the heat required to raise a single volume of it to this temperature, but another portion of heat has to be taken up in a latent form, as the air expanded—consumed as it were in lifting against the atmospheric pressure ; this may be represented sufficiently well for us, by assuming the temperature of the blast, kept to its normal volume, at 700° Fahrenheit. This is as yet, however, but a very slight addition to produce results, which so nearly approximate to those obtainable by the oxyhydrogen flame, seeing the latter has an estimated temperature of 14,000 to 15,500° Fahrenheit, while that of the present method does not much exceed 5000° Fahrenheit. The gap, as far as effects is concerned, is narrowed so much, and in a manner so unexpected, by the results here given, that one is naturally prompted to inquire whether the assigned temperature of the oxyhydrogen flame has been obtained by direct experiment, or by calculations, based upon the ascertained temperature of other flames. The temperature as calculated, indirectly, in this last way, certainly furnishes us with figures remarkably close to those just quoted. In reference to this important point, I beg to call attention to a notice, which appeared in the *Chemical News*, relative to the imperfect combusition of certain gases at high temperatures. There we learn that at moderately high temperatures (much below 10,000° Fahrenheit) oxygen and hydrogen only very partially combine—from memory, I believe, not more than to the extent of half their weight—the remainder of the gases of course combine, as the centre of heat is left behind. Thus, although the quantity of heat evolved by their combustion is the same, being divided over a larger volume, its intensity is proportionately diminished. This being so, it would seem to follow that the temperature of the oxyhydrogen flame must be very considerably lower than that hitherto ascribed to it ; and, therefore, the possibility of substituting it in this, or in some other manner equally economical, for the several purposes here specified, appears so much the greater.—*Chemical News.*

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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Forts and Ships.

IN our last issue, we took occasion to call attention to a remarkable mechanical feature of the war in Europe—the employment of the *metrailleuse* in field operations, and its probable effect upon the character of future battles. To-day we would call attention to another and possibly still more important feature, which cannot fail to attract the attention and excite the interest of military engineers.

When the news was first received that war between France and Prussia was inevitable, professional men thought with some satisfaction that at last a much-discussed question in fortification would be set at rest by the practical test of actual warfare—the efficiency of the "Modern German System of Fortication," based on the polygonal system of MONTALAMBERT. The merits and demerits of this system have long been warmly and thoroughly discussed, especially since the introduction of the heavy siege ordnance employed in modern war. Prussia had fortified many positions on this system, with more or less strength, along the line of the Rhine. Probably the strongest of these were Rastadt, Mayence, and Coblentz.

Were a French army to invade the German territory, it seemed probable that one or more of these fortresses, lying near its line of operations and threatening its communications, would be compelled to undergo the test of a regular siege.

The startling and unexpected course of events which followed rapidly the outbreak of hostilities, seems to have removed all hope of any addition to military science from this source. We suppose France must be forgiven for depriving us of the valuable results of such an experiment, since she was forced to do so by "circumstances over which she had no control."

But we should like to be informed what the French navy, so often vaunted as the finest in the world, has added to our knowledge of the noble science of war? On the Baltic Sea Prussia has now an extended coast. It is broken by many harbors undefended by gun-boats or ships of war, which offer, we should suppose, sufficiently tempting inducements to an enterprising enemy. Among these we may mention Kiel, Lübeck, Stettin, and Dantzic.

Let us suppose, for instance, that the French ships had captured Stettin, and this harbor had been employed as a base of supplies for an expedition moving on Berlin, not more than ninety miles distant; or suppose, again, that Kiel had been reduced, making possible a line of operations through a disaffected territory to the capital! But the French fleet rides quietly in the waters of the Baltic, content to blockade the Prussian coast. Is it possible that it does not dare to attempt the passage of the fortifications, or to venture under the fire of the Prussian guns?

Of all the Prussian harbors, Wilhelmshaven, on the Jahde, in the North Sea, is the most expensively and elaborately provided with means of defence. Next to this, Kiel is the most recently, and, we believe, the most strongly fortified. Here is mounted the famous 1,000-pounder rifle exhibited by Herr KRUPP at the Paris Exposition. The works at Swinemünde and Stettin are, we suppose, the next in importance, as they are the next preceding in date of construction. The most important of these defences are *casemated forts of masonry*, such as it has been the fashion lately to regard as useless in these days of iron-clads and great guns. They were devised in most, if not in all cases, before the recent improvements in modern artillery. Of course the Prussians have made use of all the known auxiliaries of defence, such as floating and sunken obstructions and torpedoes; but as these are open to the use of all nations, it would be hard to say in what the Prussian system of harbor defence surpasses that which is denominated the "Third System" of our engineers. The French inaction is, therefore, inexplicable, unless as a paralysis proceeding from the stunning effect of the Prussian land operations!

When the war is over, we shall probably learn the details of the Prussian defence; and until that time any attempt at a thorough discussion of this subject would be premature. Meanwhile we would recommend that large class of individuals who have been accustomed to decry fortifications, and who have so easily solved the knotty question of harbor defence by the use of gun-boats and ships of war, to reflect on this interesting conundrum—What has been done by the French navy?

Darwin's Theory of Species.

IT is about a dozen years since the Darwinian theory of the origin of species by natural selection was promulgated to the world. Its history has been that of continuous victory. Subjected to the only test which should be applied to a scientific hypothesis—its capability to explain all observed facts, it has not been found wanting. One after another, even apparent anomalies or exceptions have turned out upon closer inspection to be illustrations of the law; and facts, like men, have rapidly ranged themselves under its banner.

Although this theory bears, and ought to bear, the name of CHARLES DARWIN, whose marvellous learning, acuteness and industry surrounded it with an overwhelming array of proofs, yet he was not the first to announce its central principle. Dr. WELLS and Mr. PATRICK MATTHEW, British naturalists, propounded in advance of him the idea of natural selection; but failed to perceive its important applications. Mr. ALFRED R. WALLACE, author of a charming book—part science, part travel—on the "Malay Archipelago," deserves greater credit than either of these. He published in 1855 an essay "On the Law which has Regulated the Introduction of New Species," in which he undertook to show that "Every species has come into existence coincident both in time and space with a pre-existing closely allied species," and again in 1858, a paper "On the Tendency of Varieties to depart indefinitely from the Original Type," which contains a tolerably distinct though partial statement of the theory since made immortal by Mr. DARWIN.

It is pleasant to observe that there is no jealousy manifested between these rival discoverers. Mr. DARWIN is undoubtedly entitled to all the credit he has received; and he is generous enough to acknowledge fully the labor of others, independent of his own. And nothing could be handsomer than the compliment which Mr. WALLACE, in a recent preface, pays to the great naturalist—"Far abler men than myself may confess, that they have not that untiring patience in accumulating, and that wonderful skill in using, large masses of facts of the most varied kind—that wide and accurate physiological knowledge—that acuteness in devising and skill in carrying out experiments—and that admirable style of composition, at once clear, persuasive and judicial—qualities, which in their harmonious combination mark out Mr. DARWIN as the man, perhaps of all men now living, best fitted for the great work he has undertaken and accomplished."

This passage occurs in the preface to a recent work by Mr. WALLACE, entitled "Contributions to the Theory of Natural Selection," and consisting of essays on various branches of the subject, written and published at different periods, and now collected into one volume for the first time. They make a fascinating volume, the most fascinating, we think, which the debate over Darwinism has yet called forth. With all due deference to Mr. DARWIN, we would rather read Mr. WALLACE'S books than his; and certainly we think a layman would be more clearly and agreeably informed concerning this important subject, by taking DARWIN thus at second hand, than by applying directly at the fountain head.

The most important of these essays to naturalists are probably those on the Malayan butterflies, and on protective resemblances, since they contain new and most significant facts. In several of the essays, moreover, there are intensely interesting suggestions with regard to color and beauty as elements of utility in the struggle for existence. The principle of sexual selection, principally relied on by Mr. DARWIN to explain color, is supplemented by a direct argument, drawn from the uses of color to protect animals—especially birds during incubation—from keen-sighted foes. The manner in which this argument is conducted by Mr. WALLACE stamps him as a close observer and accurate reasoner.

The subject of instinct, particularly in the matter of the building of birds' nests, is ingeniously discussed; and it is shown that we have no proofs, in that instance, of anything other than example and habit, unless it be rudimentary reason—not instinct at all.

The general reader will be especially attracted by the chapter in reply to the Duke of Argyll's "Reign of Law," and to an article against the Darwinian theory which appeared in the London *Times*. This and the succeeding essays admirably state, explain, defend, and limit, the law of natural selection; and we are convinced that it can nowhere be found more forcibly, tersely, and attractively set forth.

But the highest, though partly, perhaps, the most nearly speculative, interest attaches to the closing chapters, in which this law is applied to the human race. The whole argument, as laid out by Mr. WALLACE, may (not with some damage from the condensation) be briefly stated as follows:

I. All organized beings multiply in geometric progression. Any single species, if all the individuals lived to produce young could soon fill the world.

II. Yet the number of living individuals of each species does not so increase; hence the greater part of the individuals that are born must die off. Life for each individual becomes a struggle; and the fittest for its conditions are the survivors.

III. The conditions necessary for the life of an organism are principally to eat and not to be eaten or otherwise destroyed. Fecundity seems to make little difference in the numbers of a species. The most sterile races produce more young than the conditions of food, climate, and natural enemies will allow to survive.

IV. There is a law of heredity, or resemblance between off spring and parents, as the commonest observation shows There is also a law of variation, equally well recognized. That is, no two individuals are exactly alike. Possibly this is but an effect of the law of heredity, the peculiarities of other ancestors than the immediate parents being also transmitted in varying power through successive generations.

V. There is, and has always been, a perpetual change of physical conditions on the earth's surface. When a species is adapted to these conditions, and protected against natural enemies, it flourishes; otherwise it dies out. But the normal condition of every species is an equilibrium, determined by surrounding circumstances and the survival of the fittest individuals.

VI. The effect of this "natural selection" is to preserve and erect into species the originally accidental varieties of a parent stock. The extreme varieties best suited to new conditions survive, and the connecting links, less suited, frequently disappear. These links are, however, very often supplied by the geological record; and if that record were complete and completely known, we should be able to trace the connections which now appear to be obscure or altogether wanting.

VII. Domesticated animals are removed from the operation of the law of natural selection, since they are not compelled to struggle for existence with nature or with enemies. They are varied, therefore, by the law of heredity and the law of human selection.

VIII. Man *may* have been produced as an animal by natural selection; but man's exercise of mind at once puts a stop to the operation of this law. It is the individual who wears warm clothing, not he who has the hairiest skin, that survives in a cold climate; and protection against wild beasts is obtained by devising weapons of defence. Hence, it is possible, not that man has descended from the gorilla, but that from a common remote ancestor, the descendants using the laws of nature by the superior power of mind are men; while the descendants subject to natural conditions blindly, are beasts.

IX. Mr. WALLACE argues forcibly that the brain, the absence of hair from the body, the conformation of feet and hands, the flexible and musical voice, and certain mental and moral faculties of man, could not be produced by natural selection, and adds: "The inference I would draw from this class of phenomena is, that a superior intelligence has guided the development of man in a definite direction, and for a special purpose, just as man guides the development of many animal and vegetable forms."

We have not space to follow or discuss further the train of thought which Mr. WALLACE suggests. As far as we have given it above, it appeals powerfully to our judgment; but the final positions with regard to the nature of matter and force, to which the author is led, appear to us not logically necessary, and without basis in facts. The book as a whole, however, is admirably calculated to enlighten those who are ignorant of the Darwinian theory, and to disarm the prejudices of many who are opposed to it.

Oxygen Gas Works.

IN THE ENGINEERING AND MINING JOURNAL of the 28th of September, 1869, we gave an account of the works in this city for the manufacture of this gas on a large and economical scale from the atmosphere, by the employment of the manganate of soda. Since that time, M. TESSIÉ has established large works for the manufacture of this gas at Pantin, near Paris, and has received authority to lay pipes for conducting oxygen through the streets of Paris. M. TESSIÉ has employed his oxygen gas for improving the illuminating power of the ordinary coal gas in general use, and numerous oxyhydrogen flames are said to lighten the nightly paths of the Parisians. As the plan of the process may have escaped the memory of some of our readers, we give a short description of it and subjoin an account of the recent operations from a late number of *Engineering*. We think that the subject ought, at the present time, to possess a special interest, from the fact that the idea of employing oxygen in the place of air for blast in iron furnaces, has lately attracted considerable attention. This is merely a question of economy. It would require only one-fifth as much oxygen gas as air, so that there would be quite a reduction in the cost of compressing and heating the blast; and the gases which come from the stack and are used for heating boilers and blast, would be undiluted with nitrogen and would consequently give a much intenser flame. Whether oxygen to supply the blast can be produced, for the saving of money thus effected, by any known process is very doubtful, but if it could be, numerous advantages would result from its use.

There need be no doubt entertained with regard to the applicability of this gas to useful purposes if once it could be cheaply produced on a practical scale. The different purposes for which combustion is required in all branches of manufacture would find a new field opened up for them, our power for producing heat would be increased, and with it all our facilities for producing mechanical or chemical effects would be vastly improved and multiplied. We commence with the simplest and most plausible application of oxygen gas for the purpose of increasing the illuminating effect of ordinary gas in combus-

tion. The flame of ordinary gas is overcharged with carbon; it produces much smoke, and its illuminating power is limited by these causes far below the mark which would be theoretically possible. The combustion of this gas, when mixed with a given definite proportion of pure oxygen gas, affords a much greater power of illumination. The carbon is never completely consumed, and the temperature of the flame is at the same time considerably increased. The proportion of oxygen must not, however, exceed a certain point, in fact it must not reach the point at which perfect combustion will take place and all the smoke will be consumed. At this point the flame would reach its maximum heat, and the greatest caloric effect would be produced, but the illuminating effect of the flame would be nearly equal to zero. For the purpose of illumination it is necessary therefore to remain within such limits as will afford a sufficient number of unburnt particles of solid carbon to be held in the flame at the temperature of incandescence. This can be done in a flame produced of a mixture of pure oxygen gas and ordinary coal gas, and the illuminating power of the light produced by these means is vastly superior to that of the same gas when burnt in the open air without the addition of pure oxygen.

M. TESSIÉ manufactures his oxygen from the atmospheric air, but he does so in an indirect manner. He employs a substance which is capable of absorbing oxygen from the atmosphere, and of parting with the absorbed gas under different conditions. This substance is permanganate of soda. M. TESSIÉ has invented a particular method of producing this permanganate at a moderate price. At a red heat, when exposed to a current of super-heated steam, the permanganate becomes reduced, and gives off a portion of the oxygen which it contains while absorbing the steam to a considerable extent. The oxygen which is set free can be collected in gas-holders or other reservoirs, but the mass of permanganate becomes exhausted after a short time. It is then exposed to the action of fresh atmospheric air, and it immediately takes up the oxygen, again returning to its original composition. The oxygen is evolved very readily, and the permanganate is immediately ready for being again submitted to the action of steam, and again deprived of its oxygen. In this manner the permanganate alternately becomes an absorbent of oxygen from the atmosphere, and a source for the extraction of pure oxygen. M. TESSIÉ has established a large gas-works at Pantin, near Paris. He employs furnaces heated by ordinary coal fires, and containing gas retorts made of fire-clay, very similar in every respect to ordinary gas retorts. The permanganate is reduced to a state of powder, and charged into these retorts upon a perforated cast-iron plate, which allows the steam and gases to pass through the powdered mass without difficulty. Super-heated steam is sent through the closed retort when heated to a bright red heat, and the pure oxygen evolved is led to a gas-holder close by. After complete deoxidation, the supply of steam is shut off, the door of the retort is opened, and the access of atmospheric air to the red-hot materials reconverts them into permanganate. The process can be carried on without refilling the retorts for an indefinite length of time, so that the manufacturing costs of the oxygen gas are limited to the quantity of fuel required for keeping the retorts heated, and for the supply of steam, to which are added very moderate expenses for supervision and manual labor. M. TESSIÉ has applied his oxygen gas for improving the illuminating power of gas in some localities in Paris, and the oxyhydrogen gas flames are now seen in some of the great thoroughfares in Paris, where they display an unquestionable superiority over the ordinary gas. It is probable that this interesting invention will before long rise to great importance, and will afford great advantages to many branches of industry and manufacture.

The Discovery and Production of Gold in California.

By Professor ROBERT VON SCHLAGINTWEIT.

Translated from the German by ROBERT HEUSCHKEL, M. E.

[Conclusion.]

THE different modes of gaining gold have changed the character of the landscapes in a manner hardly to be believed. I do not say too much, when I assert that many of those changes made by human hands, will be thought in future times to be the work of some mighty natural agent. Many of the natural beauties of the landscapes have been destroyed perhaps forever. Along the gentle slopes of hills, or along the banks of rivers, that had formerly been grown over by plants of all descriptions, lie enormous masses of bare and sterile ground, of conglomerates and stones brought up from deep below the surface. Not only have the rivers had their courses changed for considerable distances, but the water, formerly so clear and crystal like, appears clayey and dirty, in consequence of the earthy materials that are constantly brought down from all sides from mines and sluices.

The hydraulic process especially has left traces wherever it has been made use of, that will never disappear again. Lovely hills, that had been decorated with trees and flowers, are entirely gone, so that only granite or limestone, destitute of all vegetation, is now to be seen. Every one will leave these regions with the impression that their productive powers are destroyed forever.

The gold mining by adits is the transition from the placers to the quartz ledges. It is applied when the pay-dirt is covered to a considerable height by common dirt—top-dirt—so that the removal of it by the hydraulic process would be too costly. Tunnels are driven to the gold-bearing layers, and the dirt washed in sluices.

The working of ledges conducted on scientific principles was undertaken after the placers had long been worked. Being of an entirely different character from the washings of soluble sediments, it required miners, mechanics, and men of scientific education, and considerable more capital than even the hydraulic process. Nevertheless, more and more attention is paid in California to the working of ledges. It is beyond question, that in future times, when the original alluvial and diluvial formations are exhausted, they will have to rely solely upon the precious metals deposited in veins. Veins sometimes promise immense richness at the outcropping, but gradually get poorer and poorer, and finally, at a certain depth, nothing is left but quartz. Others show no gold near the surface, and are rich at greater depths. The general belief was, as F. V. RICHTHOFEN says, that the ledges would consist mainly of gold at great depths, since the melted gold was supposed to have been injected by volcanic eruptions. But in reality it proved entirely different. According to our knowledge and experience, gold is found in pockets, some of which have yielded hundreds or even thousands of dollars. Pockets producing $50,000 worth of gold have been found repeatedly.

Neither geology nor any other technical science has succeeded in stating with accuracy the laws according to which gold is deposited in veins. RICHTHOFEN says: "The gold-bearing quartz-veins form a narrow bridge about the middle of the western slope of the Sierra Nevada 3,000 to 5,000 feet above the level of the ocean, strike in general N. N. W.—S. S. E. The whole vein system is one of the most extensive and most regular known. The number of veins is often considerable on a small space, at other places they are more scarce, and the distances between them are often very great. They average in thickness from two to three feet, but reach six, twelve, and sometimes even twenty feet. The geological structure is very regular. The character of gangue and ore is very uniform over the whole extent of a vein, but shows very striking differences in different veins. Some veins are marked by numbers of dislocations and breakages, others remain as regular as a wall. Not one vein noted for its richness has been discovered in California by a scientific miner or geologist. Great importance was paid in the beginning to the judgment of these men, and many thousands of dollars were expended for the development of mines that did not show even 'the color of gold.' Good chance, good luck, not science, has developed the richest quartz-veins" (?)

In working ledges they generally have recourse to blasting. Since the month of May, 1868, giant-powder has been used in several mines with great success, being a more powerful explosive, requiring less labor, and consequently causes less cost. According to the statement of R. W. RAYMOND, on page 35 of his "Mines of the West," the working out of one foot of tunnel in the mine "Little Bead" costs, by application of powder, ninety-two cents, and by using dynamite, only fifty-one cents. PHILO JACOBY says in his almanac for California, 1870, that one yard of tunnel in the New Almaden mine costs, if worked with powder, $65, and if worked with dynamite, $45 50. A hundred feet of tunnel in the Oak and Reese mine costs $7,500 worked with powder, and $4,438, if worked with dynamite.

Now, since the small holes with giant-powder do as much execution as the larger ones with common powder, the comparative cost of using the two materials is as 51 to 92 in favor of the former. This gain arises from the fact, that in boring small holes, each man works by himself and requires no particular ability. Every Chinese can be employed in boring now, while in former times only few, abler and better paid men could be entrusted with the work. Another very important advantage is the decrease of disasters formerly so extremely numerous. It was necessary to trust only certain men with the blasting who knew and took the required quantity of powder and the necessary precautions in discharging it; besides that, the opportunity of pocketing pieces of rich ore was too enticing at a time, when forty or fifty men were engaged in blasting in the different parts of the mine. JACOBY says, that six months after the introduction of giant-powder in the Oak and Reese mine, $2,000 more were produced than during any similar preceding period. This surplus is considered to be the difference stolen by the miners.

With the introduction of the giant-powder a great many difficulties had to be overcome. The California miners are, as R. W. RAYMOND says, opposed to novelties which they always regard with suspicion, and in this case they were particularly suspicious, since they saw that by using the latter, work could be done much more cheaply. It was thought that the smoke of the exploded dynanite was dangerous to health, and it is true it produces headache in the case of any one who is not used to it, but soon it causes no other inconvenience than that produced by common powder. As soon as the groundlessness of that prejudice had been proved, an association of miners, who had been employed formerly in boring and blasting, established itself, according to which, the miners bound themselves not to use dynanite, nor to work in mines where it was in use. Not only by a number of resolutions, but unfortunately also by force, they endeavored to reach the purpose. But the association was not of a long duration and the introduction of dynamite spreads daily more and more over California.

The complicated chemical processes in use in Europe cannot be applied in California as long as the high prices and wages for workmen continue. RICHTHOFEN says, that with a few changes, the originally introduced method is still in use. It consists in crushing the quartz wet and allowing the sand to run first over rough linen or woollen cloth, upon which the coarser particles of gold are caught and directed afterwards over an inclined plane, arranged with horizontal lathes, filled with quicksilver, where the finer gold amalgamates; also amalgamated sheets of copper are in use at present.

Of course an enormous mass of fine leaves of gold are lost, and we can say, that the best method for producing the gold, adapted particularly for California, has not yet been found, but since copious experiments are being made, it is to be hoped that they will lead finally to practical results.

How much depends upon the method applied, was plainly proved in the Josephine mine, situated on Little Bear valley. That mine was abandoned because it would not pay $8 per ton, but since the application of the Ryerson process of amalgamation, the ores yield an average of $24 66 per ton.

The yield of a ton of ore is excessively different. In HAYWARD's mine, situated in Sutter creek, and known by the name of Amador and Eureka, at present one of the richest in California, yielded according to R. W. RAYMOND's statistical notes, in 1868, an average of $21 77; the Keystone mine in Amador county only $12 86. California had mines in former times, the ores of which averaged from $80 to $200 per ton. In our times mines yielding from $10 to $15 are worked successfully; only very few mines with less yield than $10 are worked in California. In Australia, however, ores are worked with good results, averaging from $2 50, to $1 25 per ton of 2,240 pounds, and it may be considered, that 6 millions of tons of ore yielded only $10 per ton on an average. Quite a number of gold-bearing quartz-veins in Mariposa, Nevada, and in the vicinity of Georgetown, Brownville, Placerville and other settlements, which gave only a result of $3 to $9 per ton, are not worked at all.

The quantity of gold gained by mining in California can not be stated with the least accuracy. RICHTHOFEN's opinion is, that it never over-reached the amount of fifteen millions of dollars per year.

All those who have been on any relation with mining interests in California coincide in that point, that only a thorough change of the mining laws could improve the production of gold. The law-proscriptions now in use, vague as they are, cause capital to be offered only with caution, and nearly always with distrust. It must be hoped, that the propositions made with regard to the establishing of regular mining laws, by a great number of men, both scientifically and technically educated, in particular by JOHN S. HITTELL, R. W. RAYMOND, FRED. v. RICHTHOFEN and GREGORY YALES, will be put in practice.

Carbon Photographs.

By W. H. CHANDLER.

WHEN a film of dried gelatine containing a bichromate is exposed to the action of light, it is rendered insoluble in hot water, and in proportion to the time of exposure and the intensity of the light. This fact, first observed by MM. MUNGO PONTON ET POITEVIN, several years since, is the basis of the so-called carbon process of photography, which, up to the present time, has not been very extensively employed, owing to the expense and uncertainties of the methods of applications proposed and variability of the results obtained.

Ordinary photographs by the use of salts of silver are liable to fade, even when prepared with the greatest skill. Even if all the hyposulphite of soda has been carefully removed from the print by washing, which is hardly possible, and every precaution taken to protect it from the atmosphere, the durability of the silver print is comparatively brief, when compared with the permanence of manuscripts and engravings, whose coloring matter was ink composed of carbon. The desirability, therefore, of a method of producing pictures which shall possess the advantages both of photography and engraving, the rapidity and accuracy of execution of the one and the permanency and unalterability of the other, is apparent.

The first practical process proposed was that of Mr. J. W. SWAN, of Newcastle-upon-Tyne. A film of collodion was obtained upon a glass plate, and upon this a layer of sensitized gelatine. The gelatine, colored black with India-ink, and mingled with a solution of bichromate of potash, was placed in a dish, at a temperature sufficiently warm to prevent gelatinizing, and the plate coated with collodion, floated upon it several hours. The plate was then removed and dried. The sensitizing and drying of the plate was, of course, performed in the dark. When dry, the united films of collodion and gelatine are separated from the glass, and subjected to the action of light beneath the ordinary photographic negative, the collodion side of the film and the varnished side of the negative being in contact. When the exposure is completed, the negative is removed and the proof treated upon a glass plate with warm water. This is done in the absence of light. The gelatine has been rendered insoluble just in proportion as it has been exposed to a more or less intense light, and the warm water dissolves away the unchanged gelatine, together with associated India-ink, leaving the proof of insoluble gelatine and India-ink, with its backing of collodion. This was then attached to paper by a solution of caoutchouc in benzine and pressure between rollers.

The double transfer to glass and paper was the most inconvenient portion of this process, and was avoided by Mr. J. R. JOHNSON's plan. The colored solution of gelatine, free, however, from the bichromate, and containing a little sugar, is maintained at a temperature warm enough to prevent gelatinizing, and a band of paper slowly passed through the liquid. The coating of gelatine is partially dried, and the dipping repeated until the desired thickness of gelatine is obtained. This paper is sensitized, when wanted, by placing it for two minutes in a solution of bichromate; it is then dried and exposed to the light under the negative. When the exposure is completed the negative is removed, and the proof moistened and attached, without any adhesive material, to any surface impervious to water. (If paper is used for the support, it is first treated with albumen precipitated with alcohol, to render it impervious to water.) The unaltered gelatine and backing of paper are now removed by treatment with warm water, as in the first process. There is thus obtained a picture in relief, and when thoroughly dry the gelatine is exceedingly hard. If placed in an hydraulic press, in contact with a sheet of lead, and a heavy pressure brought to bear upon it, a reverse impression in the lead is obtained, capable of producing a thousand impressions. From each gelatine relief several lead plates can be made. The method of printing with these lead plates is as follows: A mixture of gelatine and ink is poured upon the plate, and a sheet of paper pressed upon it. The paper is then

removed, and the impression of gelatine fixed by a solution of alum. This last is the improvement of Mr. W. B. WOODBURY. With some minor details of execution this process was employed by parties in England, but the results have not been satisfactory, and the business proved financially a failure. The last improvement, which has finally rendered the carbon process practicable, was accomplished by Mr. JOSEPH ALBERT, of Munich, and consists in the use of a transparent medium as a basis for his gelatine, instead of metallic plates or paper. Thus the progress of the action of the light can be watched and stopped at the proper time.

We have received from Mr. EDWARD BIERSTADT the general details of the process, as follows :

"A piece of plate glass, after being cleaned, is flowed with a mixture of albumen, gelatine, and bichromate of ammonia, and placed in a horizontal position to dry ; when dry, it is laid upon a piece of black velvet, with the coated side dowd, and exposed for a short time to the light from the side upon which there is no film. The plate is then removed to the dark room, and immersed in cold water for half an hour, or until all traces of bichromate are removed. The object of placing the glass, during exposure, upon black velvet is to absorb the penetrating rays as much as possible, so that the coating of gelatine may retain adhesive properties sufficient to secure the second film of gelatine firmly attached.

"We have thus far obtained upon the glass a coating of gelatine firmly attached and rendered insoluble in warm water, as a foundation for the second coating. which consists of isinglass, gelatine, and bichromate of ammonia. This is then dried and exposed to the light, under a negative, in a pressure frame, as in the ordinary photographic process ; the action of the light is watched from the back, and the plate removed at the proper moment. It is then washed to remove the unchanged chromates, the film hardened with chromealum, chlorine-water, or any other coagulating material, and set aside to dry. When dry, it is printed from, as with a lithograph, in a press adapted to the purpose. As many as 2,000 impressions have been made from a single plate, without any perceptible difference in their quality."

The pictures obtained by this process, received from Munich, and inspected by the writer, are equal in execution to any untouched photographs ever inspected by him. The establishment of the new process in this country is certain, and, ere long, the beautiful carbon prints will be as common as the photographs by the silver process.—*American Chemist.*

The Decay of Stone.

FROM *Engineering* we learn that the recommendation of Mr. E. M. BARRY, the architect of the Houses of Parliament, and of Mr. F. A. ABEL, the chemist of the War Department, to attempt the arrest of decay in the stone-work of the Westminster Palace, has just been produced in a report, ordered to be printed by the House of Commons. This recommendation is *oil.* To cover the walls of the building, to saturate its tracery, and to soak its sculptured frontage, is the process suggested by these gentlemen. A process ancient and inefficient—one that has long been superseded by other less imperfect though crude methods, which in their turn have given place to the more recent and scientific methods. The fact is, that a less satisfactory means of preserving stone could hardly have been proposed, and the wonder is that such men as Messrs. BARRY and ABEL should have been so short of resources that they could recommend nothing more efficient. Not only would oil be difficult of application, but, perishable as it is, it would quickly change its nature, oxydize and thicken, until it attracted the floating impurities in the atmosphere, and would only conceal the hastening work of decay. Without advancing to the present time, more suitable remedies might have been offered for consideration ; soft soap and alum would have been better, so would wax ; while paraffine, carefully applied, would have answered best of all. But the time is past for prescriptions such as these, and the successful method devised by Mr. F. RANSOME affords a rapid and effectual means of successfully preserving the stone, hitherto a thing never accomplished. We have already alluded to this process, and it is known that when it has been used good results have always followed. As is well known, it consists in the successive application of three solutions, the first containing soluble phosphate of lime ; the second, baryta ; and the third, a solution of silicate of potash, rendered neutral by the late Professor GRAHAM'S well-known process of dialysis. These solutions, successively applied, combine and form an insoluble and imperishable mineral compound, which effectually resists the action of the atmosphere, and by indurating the stone, at once arrests its disintegration. The extensive experience which has been gained by the adoption of this method, places it far beyond the region of experiment, and justifies its recommendation under nearly all circumstances. And there can be no reason why, successful in every case hitherto, it should fail if it were properly applied to the failing stone-work at Westminster.

That the Ransome, or some such analogous process will have to be adopted for the preservation of many of our metropolitan public buildings is certain. From a variety of causes independently of age, some of our finest structures are yielding to the insidious attacks of impure atmosphere and impure rainfall. The same forces of nature ever at work destroying one combination to gain the material wherewith to rear up another, and which slowly and constantly disintegrate and crumble rocks, blending them indistinguishably with the soil, is fortified by the powerful allies, called into existence by the never-ceasing necessities of the metropolis, and wears out the stones employed in our buildings, with a rapidity dependent upon the class of material upon which the forces act.

Limestone, if containing magnesia, attacked by the sulphurous acid-laden atmosphere, effloresces quickly with a soluble sulphate of magnesia. If it hold carbonate of lime only, the same agent rapidly produces soluble crystals of sulphate of lime.

Sandstone again is destroyed because the action of the atmosphere rapidly changes the insoluble calcareous cement which binds the particles together into a soluble form, and the whole material crumbles when its cement is thus destroyed. And while the air charged with the destructive agents is a never-ceasing and perpetual enemy, the impregnated rain-water is not only formidable from the same cause, but is formed into a force more actually dangerous, because its effects are intensified and localized, as evidenced by the ruin it produces in many public buildings, in places exposed to its concentrated influence. Not only, indeed, does the rain-water wash away by degrees the soluble portion of stone changed by the atmosphere, but, containing within itself the elements of destruction, it forms a more active agent which can be resisted only by rendering the stone impervious to its action. And this can only be done by indurating the material so that it may be enabled to set the opposing elements at defiance, which neither oil nor any of the old-fashioned mechanical or chemical appliances of the past are able to effect.

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107,209, antedated September 3, 1870.—TAPER HOLDER.—Henry B. Adams, New York, N. Y.
107,210.—BLIND FASTENER.—Franklin Babcock and Frederick Babcock, Middletown, Conn.
107,211.—SAWING-MACHINE.—Jas. T. Baggs, Bridgeport, Conn.
107,212.—COFFIN HANDLE.—Alonzo B. Bailey, Cobalt, Conn.
107,213.—SPRING BED BOTTOM.—Henry Dwight Wright Bailey, Sterling, Ill.
107,214.—HARVESTER.—Moses Bales and William P. Bales, London, Ohio.
107,215.—EXTENSION TABLE.—Melvin Bancroft, Montague, Mass., assignor to George F. Richardson & Co., same place.
107,216.—MACHINE FOR MAKING FLANGED AND BEADED HOOPS.—Joel Blood, Watertown, N. Y.
107,217.—REFRIGERATING CAR.—Alfred Booth, Chicago, Ill.
107,218.—PLOW, PLANTER, AND CULTIVATOR.—Elijah Bourne, New Iberia, La.
107,219.—MUSIC STAND.—Lewis V. Brown, Salisbury, N. C.
107,220.—SHUTTLE FOR LOOM.—Hugo Carstaedt, New York, N Y.
107,221.—MOTIVE POWER.—John M. Cayce, Franklin, Tenn.
107,222.—MACHINE FOR TENONING WINDOW SASH.—Frank G. Chapman, Chicago, Ill., assignor to himself and Dennis Beach, same place.
107,223.—HANDLE FOR TABLE AND OTHER CUTLERY.—Matthew Chapman, Greenfield, Mass.
107,224.—SOFA.—Julius Cicsor, Davenport, Iowa.
107,225.—ADJUSTABLE LIFTING-LADDER.—George Claflin, Miller's Corners, N. Y.
107,226.—ICE VELOCIPEDE.—Mark Coffin, Milton, Ky.
107,227.—STONE ADZ.—William Covart, Claytonville, Kansas.
107,228.—PLOW.—Albert A. Dailey, Wilson, N. Y.
107,229.—POTATO DIGGER.—Cook Darling, Utica, N. Y.
107,230.—KNITTING MACHINE.—Owen Davis, New Lebanon, Ind.
107,231.—LADIES' BOOT.—Edgar F. Doty, Ravenna, Ohio.
107,232.—ROOFING COMPOUND.—Joseph V. Douglass, Philadelphia, Pa., assignor to himself and James A. Craig, same place.
107,233, antedated September 1, 1870.—TRACTION ENGINE.—William C Douthett, Chicago, Ill.
107,234.—GAS BURNER.—Antoine Ernest Dupas, New Orleans, La.
107,235.—PLANTER AND CULTIVATOR.—Nathan Earlywine, Centreville, Iowa.
107,236.—CARPET BAG CUTTER.—William Eberhard, Akron, Ohio, assignor to himself and J. P. Alexander, same place.
107,237.—MOUNTED HORSE-POWER.—Massena B. Erksine, Racine, Wis.
107,238.—ELASTIC NASEL PLUG.—James J. Essek, Newport, R. I.
107,239.—SELF REGISTERING WEIGHING SCALES.—Henry Fairbanks, St. Johnsbury, Vt.
107,240.—RECORDING WEIGHING-SCALES.—Henry Fairbanks, St. Johnsbury, Vt.
107,241.—DEVICE FOR MOLDING PLASTER CORNICES.—Smith Ferris, New York, N. Y.
107,242.—HAND PUNCH.—Omri C. Ford, Burlington, assignor to himself and N. C. Stiles, Middletown, Conn.
107,243.—PISTON PACKING.—Walter J. Ford, Chicago, Ill.
107,244.—MANNER OF TREATING COD LIVER AND CASTOR OILS.—George Wakefield Fox, Manchester, Great Britain.
107,245.—BRACKET SHELF.—Isaac H. Frost, Bristol, Conn.
107,246.—GALLEY REST.—Henry H. Gale, Eugene City, Oregon.
107,247.—CLAMP.—Francis Glasser, Mystic Bridge, Conn.
107,248.—BIAS CUTTER.—John H. Goodfellow, Troy, N. Y.
107,249.—APPARATUS FOR MOVING BUILDINGS.—Matthew N. Gordon, Fosters Crossing, assignor to himself and James S. Gordon, Cincinnati, Ohio.
107,250.—MARKING POT.—William H. Green, New York, N. Y., assignor to himself and Frederick McH. Kitching, same place.
107,251.—PERMUTATION LOCK.—Martial Hainque, San Francisco, Cal., assignor to himself and Alexander Stieger, same place.
107,252.—CARRIAGE.—George W. Ham, Parsonfield, Me.
107,253.—LID-FASTENING FOR BURIAL CASKET.—William Hamilton, Allegheny City, Pa.
107,254.—GATE.—Jacob H. Harnly, Penn township, Pa., assignor to himself and Ellis L. Spickler, same place.
107,255.—MULTIPLE TOOL.—Henry J. Harris, Shreveport, La.
107,256.—HORSE HAY-RAKE.—George Hanck, Mechanicsburg, Pa.
107,257.—REVOLVING TABLE.—William H. Henderson and Walter S. Jones, Thaxton's Swith, Va.
107,258.—TABLE.—George H. Henkel, Hartford City, Ind.
107,259.—MACHINE FOR HUSKING CORN.—Joel Hood, Milwaukee, Wis
107,260.—STOVE PIPE BAND AND SHELF.—Reuben Hoover, Vernon Centre, Minn.
107,261.—BED BOTTOM.—Darlington Hoskins, Philadelphia, Pa.
107,262.—APPARATUS FOR CARBURETING AIR AND GAS.—J. Burrows Hyde, New York, N. Y.
107,263.—BLOW PIPE.—J. Burrows Hyde, New York, N. Y.
107,264.—TRAP ATTACHMENT FOR GAS FIXTURES.—J. Burrows Hyde, New York, N. Y.
107,265.—STEAM ENGINE.—William Inglis, Bolton, and John Frederick Spencer. London, England.
107,266.—MOLD FOR DRYING CIGAR-FILLINGS.—Samuel B. Jerome, New Haven, Conn., assignor to "Samuel Peck & Co," same place.
107,267.—WASHING MACHINE.—Powell Johnson, Des Moines, Iowa.
107,268.—CARBURETING APPARATUS.—Moses W. Kidder, Lowell, Mass.
107,269.—HARROW.—Andrew Lewis, Hastings, Minn.
107,270.—SAW DRESSING MACHINE.—John Mallory, Penn Yan, N. Y.
107,271.—IRONING TABLE.—John F. Martin and William A. Schaffer, Harrisburg, Pa.
107,272.—SPRING WEIGHING SCALES.—Jean Victor Mathevit, Cleveland, Ohio.
107,273.—REVERSIBLE CENTER PINION FOR WATCHES.—Jean V. Mathevit, Cleveland, Ohio.
107,274.—PISTON PACKING.—Franklin McConnell, Dowagiac, Mich.
107,275.—TIGHT AND LOOSE PULLEY.—John G. McCormick, Louisville, Ky.
107,276.—LAMP.—Francis McDaniels, Philadelphia, Pa., assignor to Charles D. Macqueen.
107,277.—LAMP.—Rufus S. Merrill, Boston, Mass., assignor to himself, Joshua Merrill, and William B. Merrill, same place.
107,278.—LAMP.—Rufus S. Merrill, Boston, Mass., assignor to himself, Joshua Merrill, and William B. Merrill, same place.
107,279.—LAMP BRACKET.—Rufus S. Merrill, Boston, Mass., assignor to himself, Joshua Merrill, and William B. Merrill. Boston, Mass.
107,280.—CORN PLANTER.—Solomon Mickley, York, assignor to himself and Samuel Leathery, Rossville, Pa.
107,281.—SASH HOLDER.—Alonzo D. Millard, Canton, Ohio.
107,282.—CHIMNEY CAP.—Benjamin F. Miller, and Joseph G. Miller, New York, N. Y.
107,283.—WASHING MACHINE.—Alfred L. D. Moore, La Grange, Texas.
107,284.—CHURN.—John Moyers, Hillsborough, Ohio.
107,285.—CUTTING OR LAP BOARD.—Norman O'Donnel, Cincinnati, Ohio.
107,286.—REGISTERING WEIGHING-SCALES.—Harvlin Paddock, St. Jounsbury, Vt., assignor to himself and Franklin Fairbanks, same place.
107,287.—EARTH PULVERIZER.—John W. Pence, Clayton, Ohio.
107,288.—THREAD SPOOL.—Chauncey V. Pettibone, Fond du Lac, Wis.
107,289.—SHOE.—Joel Putnam, Danvers, Mass.
107,290.—SEAMING THE ENDS OF METALLIC ROOFING-PLATES.—George A. Reynolds, Rochester, N. Y.
107,291.—LATHE CHUCK.—John Rich, Painesville, Ohio.
107,292.—ANIMAL TRAP.—James Richardson, Westport, Mo.
107,293.—MARINE STEAM BOILER.—Thomas Rimmer, South Braintree, Mass.
107,294.—MARKING ATTACHMENT TO CORN-PLANTER.—Eli Sawyer, Madison, Iowa.
107,295.—CLOTHES DRIER.—Andrew Scheff, Raymondville, N. Y.
107,296.—MOWING MACHINE.—Henry F. Shaw, West Roxbury, Mass.
107,297.—FENCE.—Phineas L. Sherman, Geneseo township, Iowa.
107,298.—COLTER.—Henry M. Skinner, Rockford, Ill.
107,299.—LAMP WICK.—P. J. Skinner, Oswego, N. Y.
107,300.—SHOE STAY STOCK AND MACHINES FOR MAKING THE SAME.—Stephen N. Smith, Providence, R. I., assignor to the Union Eyelet Company, same place.
107,301.—AUTOMATIC CIRCUIT CLOSER FOR ELECTRO-MAGNETIC BURGLAR-ALARM.—James P. Snyder, Brooklyn, N. Y.
107,302.—CORN-PLANTER.—Peter Soule, Windsor, N. Y
107,303.—ATTACHING INSULATOR TO TELEGRAPH-POLE.—Joseph B. Stearnes, Boston, Mass.
107,304.—WRENCH.—Daniel C. Stillson, Charlestown, Mass.
107,305.—MACHINE FOR BENDING RAKE TEETH.—James Sugden, Pittsburg, Pa.
107,306.—CHURN.—John G. Talbot, Sloansville, N. Y.
107,307.—CIGAR MACHINE.—Isaac Ten Eyck and John O. Reilly, New York. N. Y., said Reilly assigns his right to Tenn Eyck.
107,308.—SAFETY VALVE.—Nicholas Thomas, Chicago, Ill.
107,309.—HORSE POWER APPARATUS.—Edward O. Thompson, and Charles B. Thompson, Thomasville, Ga.
107,310.—BOOK HOLDER.—William J. Thorn, Westbrook, Me.
107,311.—FLOUR AND GRIST MILL.—Andrew J. Vandegrift, Covington, Ky.
107,312.—DEVICE FOR CATCHING AND HOLDING HOGS.—Frederick Voss, John P. Hax, and Henry Krug, St. Joseph Mo.
107,313.—MECHANISM FOR OPERATING THE PICKERS OF LOOMS.—Elias A. Wareham and William H. Waggoner, Kirkville, Iowa.
107,314.—SNOW SHOVEL.—William P. Wentworth, Seneca Falls, N. Y.
107,315.—CHEESE HOOP.—Samuel Wilson, Watertown, N. Y.
107,316.—REED ORGAN.—George Wood, Cambridgeport, Mass.
107,317.—PLATFORM SCALES.—Henry Wood, Manchester, England.
107,318.—CONSTRUCTION OF CYLINDERS OF KNITTING-MACHINES. Charles H. Young Lake Village, N. H.
107,319.—KINDLING WOOD.—Merrit T. Arnold, Summit, R. I.
107,320.—PAPER FEEDING APPARATUS.—John T. Ashley, Brooklyn. E. D., N. Y.
107,321.—POTATO AND FRUIT PEELER.—Mahlon B. Atkinson, Georgetown, D. C., assignor to himself and James H. Welch, same place.
107,322.—REFINING IRON AND STEEL.—James E. Atwood, Pittsburg, Pa.
107,323.—SIDING FOR BUILDINGS.—Clark Avery, San Francisco, Cal.
107,324.—PROCESS OF OBTAINING GLYCERINE FROM SOAP-MAKER'S SPENT LYE.—Benjamin T. Babbitt, New York, N. Y.
107,325.—BRACELET.—William H. Ball and Thomas Barnard, Newark, N. J.
107,326.—STEERING APPARATUS FOR TORPEDO-BOATS, &c.—John Archibald Ballard Bombay, India.
107,327.—POTATO DIGGER.—Leander Berry, Clyde, N. Y.
107,328.—VINE PULLER FOR POTATO DIGGERS, &c.—Leander Berry, Clyde N. Y.
107,329.—MACHINE FOR EMBOSSING CAPSULES.—William Betts, No. 1. Wharf Road, City road, England.
107,330.—CAR-STARTER.—John Bevan, Hudson, N. Y.
107,331.—POWER METER.—John A. Bradshaw, William H. Brown, and Darius B. Whithed, Lowell Mass.
107,332.—BUTTON HOLE CUTTER.—Talmon Clifford Bush, New Haven, Conn.
107,333.—AWNING AND FAN FOR HORSES' HEADS.—Harvey L. Byrd, Baltimore, Md.
107,334.—WIRE CUTTER.—Frank Carew, South Hadley Falls, Mass.
107,335.—DRAFT HARNESS.—George Chamberlin, Olean, N. Y.
107,336.—BROOM OR MOP CLAMP.—Eugene Chapman, Lacon Ill.
107,337.—ROTARY HARROW.—Geo. Collins, Fremont, Nebraska.
107,338.—GRAIN SEPARATOR.—Hezekiah Cook, Dillsburg, Pa.
107,339.—CHARRING BARREL-HEADS.—Jacob D. Copenhaver, Martinsburg, West Va.
107,340.—PADDLE WHEEL.—Matthew A. Crooker, New York, N. Y.
107,341.—WATER REGULATOR.—George W. Darby and Amos S. Moon, Blanchester, Ohio.
107,342.—TRANSPOSING MECHANISM FOR ORGAN.—Willard G. Day, Baltimore, Md.
107,343.—SPOOL SHOW CASE.—Ira Dimock, Florence, Mass.
107,344.—HARROW.—James Dingman, Decatur, Ill.

107,345.—SLED.—Charles H. Douglas, Hartford, Conn.
107,346.—SAW TABLE.—Charles H. Douglas, Hartford, Conn.
107,347.—COMBINED FURNACE AND RANGE.—Eben Edward, South Boston, assignor to himself and Ebenezer Sanborn, Boston, Mass.
107,348.—SPRING BED BOTTOM.—Alexander Hamilton Fatzinger, New York, N. Y.
107,349.—MACHINE FOR HULLING COTTON SEED.—William R. Fee. Cincinnati, Ohio.
107,350.—LOCKING BOLT.—Henry Feyh, New York, N. Y.
107,351.—SHEET METAL CUTTING MACHINE.—Seymour B. Fitch, Walton, N. Y.
107,352.—WOOD PAVEMENT.—Maurice Fitzgibbons, New York, N. Y.
107,353.—GRINDING MILL.—Joseph A. Forsman, Chicago, Ill.
107,354.—SHUTTER FASTENER.—Albert L. France, Wilmington, Del.
107,355.—THRASHING MACHINE.—Matthias Fuos, Castroville, Texas.
107,356.—TUBULAR GRATE.—Benjamin Garvin and Rush J. Pettibone, Oshkosh, Wis.
107,357.—CORN CULTIVATOR.—William Gilman, Ottawa, Ill.
107,358.—EARTH CLOSET.—Henry John Girdlestone and John Ward Girdlestone London, England, assignors to the Earth Closet Company, Hartford, Conn.
107,359.—COMBINED CULTIVATOR AND GRAIN DRILL.—John Gire, Sipton, Ill.
107,360.—CARRIAGE.—Simon P. Graham, Columbus, Ohio.
107,361.—HARNESS PAD.—George W. Graves, Chicago, Ill.
107,362.—SPITTOON HOLDER.—Chauncey O. Haley, Westfield, Mass.
107,363, antedated September 5, 1870.—TRIP MOTION FOR PRESSES, &c.—Albert Hamlin, Brooklyn, N. Y., assignor to Mays & Bliss, same place.
107,364.—MEAT CUTTER.—Thomas Hartley, Bridgeport, Ohio.
107,365.—HAY TEDDER.—Moses B. Harvey, Stafford, Conn., assignor to himself and Harrison F. Cook, same place.
107,366.—LAMP AND LANTERN.—William Harvie, Glasgow, North Britain
107,367.—PRESERVING MEAT.—Francis H. Hatch, New Orleans, La., and Benjamin R. Hawley, Normal, Ill.
107,368.—PROCESS FOR MANUFACTURING TOBACCO PLUGS.—Randall D. Hay, Crooked Creek, N. C.
107,369.—MACHINE FOR FASTENING SOLES.—Charles H. Helms, Poughkeepsie, N. Y.
107,370.—SEAL FOR METAL STRAPS ON BOXES.—James P. Herron, Atlanta, Ga.
107,371.—COTTON AND HAY PRESS.—Jas. P. Herron, Atlanta, Ga.
107,372.—WIND WHEEL.—James O. Heyworth, Chicago, Ill.
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107,374.—UMBRELLA FRAME.—Algernon S. Hubbell, Providence, R. I.
107,375.—IRRIGATING MACHINE.—William W. Hull. Ashland, N. Y.
107,376.—PROPELLER.—Robert Hunter, New York, N. Y.
107,377.—Suspended.
107,378.—COMBINED CORN HUSKER AND SHELLER AND GRAIN-THRASHER AND CLEANER.—James W. Huntoon, Washington, D. C.
107,379.—HORSE POWER.—James W. Huntoon, Montgomery, Ala.
107,380.—GAS METER.—Hyam J. Hyams, Pittsburg, Pa.
107,381.—KNITTING MACHINE.—George Johnstone, Philadelphia, Pa.
107,382.—ROOFING COMPOSITION.—William H. Jones, Newport. Ky., assignor to himself and D. G Brumback, same place.
107,383.—SPRING MATTRESS.—William B. Judson, Poughkeepsie, N. Y.
107,384.—PROPELLING APPARATUS.—Richard Kearney, Havre De Grace, Newfoundland.
107,385.—DEVICE FOR FOLDING AND IRONING SHOE UPPER EDGES. Charles A Keith, Danvers, Jeremiah Keith, Charlton, and Thomas K. Keith, Lynn, Mass.
107,386.—BUGGY-SPRING.—George W. Kenan, Upper Sandusky, Ohio.
107,387.—COATING FOR STEAM PIPES, BOILERS, &c.—Wladyslaw T. Kosinski, Philadelphia, Pa.
107,388.—PAPERING MACHINE.—George M. Lane, De Graff, Ohio.
107,389, antedated September 3, 1870.—HAT AND CAP-BRACKET. Theodore Lawrence, Peoria, Ill., assignors for one half to Romeo Lawrence, same place.
107,390.—WASHING MACHINE.—Reuben Lighthall, Brooklyn, N. Y.
107,391.—SCREW CLAMP FOR PIANO PINS.—Charles M. Lindsay, Forreston, Ill.
107,392.—OUTRIGGER FOR ROW BOAT.—Andrew Jackson Luffberry, Jr., Philadelphia, Pa.
107,393.—DITCHER AND GRADER.—John H. Martin, and Clinton D. Bradshaw, Danville, Ill.
107,394.—COOKING STOVE.—James H. McConnell, Beaver Falls, Pa.
107,395.—PROVISION SAFE.—Wait Mead and George E. Starbuck, Chestertown, N. Y.
107,396.—ROTATING FAN AND FLY BRUSH.—Oliver Metcalf, Orleans, Ind.
107,397.—SCRUBBING BRUSH.—Damian Minderle, St. Louis, Mo.
107,398.—DEVICE FOR SECURING COVERS UPON SEWING MACHINES. John H. Mooney, San Francisco, Cal.
107,399.—MACHINE FOR MAKING PAPER COLLARS.—Charles E. Moore, Boston, and Martin L. Wyman, Melrose, Mass.
107,400.—CORN PLOW.—Felix G. Mourning, Bascow, Ill.
107,401.—LOCK FOR SEWING MACHINE CASE.—Herrman O. Nauen, New York, N. Y.
107,402.—CORN PLANTER.—Henry Austin Nicholls, St. Louis, Mo., assignor to Alonzo B. Pearson, same place.
107,403.—APPARATUS FOR CARBURETING AIR.—Henry Oertel, Memphis, Tenn.
107,404.—THILL COUPLING.—Justin H. Ormsby, Dixon, Ill.
107,405.—ICE PRESERVER.—James E. Pilkington, Baltimore, Md.
107,406.—VALVE IN STEAM APPARATUS FOR DRESSING STONE.—Leon Pochett, Vendome, Loir Et Cher, France.
107,407.—SAP BUCKET.—Charles C. Post, Hinesburg, Vt.
107,408.—JOURNAL BOX FOR RAILWAY CARS.—Abijah L. Raplee, Edwin, assignor to Carrie R. Laman, Painted Post, N. Y.
107,409.—DOUBLE SHOVEL PLOW.—Samuel Garret Rayl, Agency City, Iowa.
107,410.—CORN SHELLER.—George W. Reisinger, Harrisburg, Pa., assignor to William A. Middleton, same place.
107,411.—HORSE HAY RAKE.—Macedon J. Robinson, Ashley, Ill.
107,412.—OPERATING THE PICKER STAFF OF LOOMS.—Wanton Rouse, Taunton, Mass.
107,413.—MORTISING MACHINE.—David S. Shearer, Waupun, Wis.
107,414.—COMBINATION AND REGISTER PADLOCK.—Henry S. Shepardson, Shelburne Falls, Mass.
107,415.—COMPOUND MACHINE FOR SHEARING, PUNCHING, UPSETTING AND BENDING METAL.—Wright Sleeper, Coaticooke, Canada.
107,416.—CULTIVATOR.—George H. Smith, Des Moines, Iowa.
107,417.—DRIER.—Marshall P. Smith, Baltimore, Md.
107,418.—CUPBOARD LATCH.—William E. Sparks, New Haven, Conn., assignor to Sargent & Co., same place.
107,419.—SPOON.—George H. Spencer, Cleveland, Ohio, assignor to himself and Joshua B. Glenn, same place.
107,420.—FINGER GUARD.—George H. Spencer, Cleveland, Ohio, assignor to himself and Joshua B. Glenn, same place.
107,421.—CHIMNEY.—Alvah J. Sprague, Springfield, Mo.
107,422.—LOCK FOR BAGS, &c.—Bernard Steinmetz, Paris, France.
107,423.—CURD AGITATOR.—Byron G. Swain, Colden, N. Y.
107,424.—CIDER MILL.—Lewis R. Taylor. Clark township, Ind.
107,425.—WRENCH.—Henry Tregellas, Calumet, Mich.
107,426.—WATER ELEVATOR.—Bernhard Vater, New York, N. Y.
107,427, antedated September 3, 1870.—METHOD OF GRAFTING. David S. Wagener, Putney, N. Y.
107,428, antedated September 5, 1870.—COATING EMBOSSED WOOD.—Sylvester P. Wheeler, Bridgeport, Conn.
107,429.—SHINGLE MACHINE.—O. T. Williams, Smithland, Ky.
107,430.—WASHING MACHINE FOR WASTE, &c.—William F. Witte, Whitemarsh, assignor to Charles Robbins, Philadelphia, Pa.
107,431.—WASHING-MACHINE.—John B. Woolsey, Bloomfield, Iowa.
107,432.—MECHANICAL MOVEMENT.—Daniel Zeigier, Lewistown, Pa.

REISSUES.

4,117.—BALANCE SLIDE VALVE.—Thomas M. Herriott and Samuel Meyers, South Pittsburg, Pa.—Patent No. 84,278, dated November 24, 1868.
4,118.—CROQUET TABLE.—Henry R. Heyl, Philadelphia, Pa.—Patent No. 104,151, dated June 14, 1870; antedated May 30, 1870.
4,119.—PLOW.—James Vandegrift, Princeton, Ill.—Patent No. 69,867, dated October 15, 1867.
4,120.—TOY VELOCIPEDE.—Nathan S. Warner, Bridgeport, Conn.—Patent No. 94,676, dated September 7, 1869.
4,121.—BOAT FOR TRANSPORTING RAILROAD CARS.—Jesse Wheelock, Lancaster, N. Y.—Patent No. 22,759, dated January 25, 1859.
4,122.—MACHINE FOR ROLLING LEATHER.—Joel Whitney, Winchester, Mass.—Patent No. 37,991, dated March 24, 1863.
4,123.—MOTIVE POWER FOR SEWING AND OTHER MACHINES.—Jacob Zuckermann, San Francisco, Cal.—Patent No. 87,020, dated February 16, 1869.

DESIGNS.

4,346.—COMBINED TOP PLATE, COMBUSTION, AND AIR-CHAMBER OF A VAPOR GENERATOR AND BURNER.—Joshua Comly. Philadelphia, Pa.
4,347.—STOVE PLATE.—George W. Eddy, Waterford, N. Y.
4,348.—HANDLE OF SPOON, FORK, &c.—Charles D. Hall, Bristol, Conn., assignor to "the Bristol Brass and Clock Company," same place.
4,349.—COAL AND WOOD COOKING STOVE.—Conrad Harris and Paul W. Zoiner, Cincinnati, Ohio.
4,350.—BOX FOR THE TOP OF BUREAUS.—Cheney Kilburn, Philadelphia, Pa., assignor to Kilburn & Gates, same place.
4,351.—BOX FOR THE TOP OF BUREAUS.—Cheney Kilburn, Philadelphia, Pa., assignor to Kilburn & Gates, same place.
4,352.—BOX FOR THE TOP OF BUREAUS.—Cheney Kilburn, Philadelphia, Pa., assignor to Kilburn & Gates, same place.
4,353.—BREAST SLIDE FOR HARNESS.—Henry W. Minnemeyer, Allegheny City, Pa;
4,354.—TRACE CARRIER FOR HARNESS.—Samuel Reynolds, Allegheny City, Pa.
4,355.—CLAMP FOR TRUNK CORNER.—Thomas L. Rivers, Newark, N. J.
4,356.—HAT.—Isaac B. Wentworth, New York, N. Y.

Petroleum in Illinois.

By far the most valuable observations, in that they interest nearly every class in an educated country, were the following by Dr. HUNT, the distinguished Canadian geologist, and President of the Association, concerning the petroleum deposits of the Northwest, especially in the vicinity of Chicago. Petroleum, Dr. HUNT proves to be indigenous to certain limestones, not, however, entering into them, as is sometimes stated, by distillation from neighboring schists; these schists have not been subject to great heat, and the petroleum limestone often lies far below such formations. The oil is usually found in patches and bands, with strata above and below containing no oil. The oil is hermetically sealed in the pores of the limestone, and escapes only on line of disturbances, again accumulating in fissures or on overlying strata. Near Chicago there is true limestone of the Niagara formation, thirty-five to forty feet thick, filled with oil and really containing nearly half its weight in oil; every square mile has 7¾ million barrels of real petroleum. As Pennsylvania in ten years yielded 28,000,000 barrels of oil, it follows that within four square miles of the Chicago limestone there is more oil than has been obtained altogether in ten years in Pennsylvania. However, this oil is not obtainable, as it does not appear with pools that force it out in spouts in other places where its collection has been a success. The whole secret is that heat is vitally necessary to the separation of oil and its absorbent rocks. In relation to this subject, Professor NEWBERRY bore testimony to the general accuracy of the conclusion of Dr. HUNT, but his experience warned him to regard limestone as by no means the only source of oil—in fact, stratified bituminous shales, that so largely abound with palæozoic rock, hold oil and yield it liberally. Some of this in Pennsylvania, too, is of unquestionable animal origin. In that State bituminous shales underlie all the productive oil wells, separated hundreds of feet from the limestone, which is besides impervious. These shales yield oil spontaneously, and over all of them are sandstones, allowing easy escape. The practical work of oil-getting is largely indebted to these investigations for success in boring, and the present discoveries are no less important than preceding ones. Continuing this interesting discussion, Dr. HALL, the eminent geologist of our State, averred that 200 miles of limestone, of the Niagara group in this State, upon being tested yielded drops of petroleum, and when exposed to heat the oil would run out in streams. A specimen from Block creek, now in the State Museum at Albany, has been dripping with petroleum for thirty years. From the Marcellus shale, and that of Genesee, Portage and Chemung, there are constant emissions of inflammable gas in prodigious quantities, and an escape of petroleum in small quantities. In none of these localities, however, are there any productive oil wells. The outcrop is nearly on a plane, or without undulations or apex, and on this account the doctor had always discouraged boring wells along these hills, though it is certain that, had the country originally been disturbed so as to produce some interclinical flexures where the slowly oozing oil could have accumulated, there would now be numberless productive wells in that part of the State.—*Philadelphia Railroad and Mining Register.*

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

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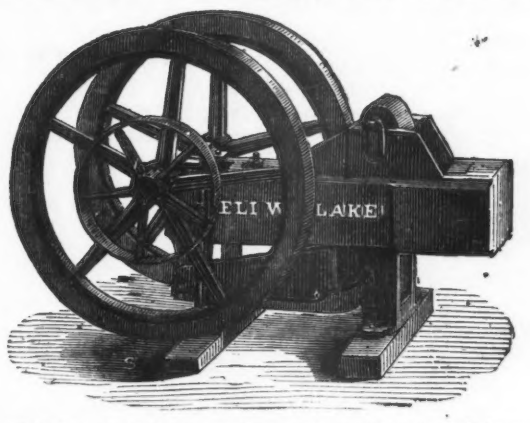

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May 24:1y

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Jun28:1y

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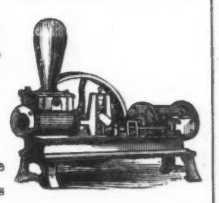

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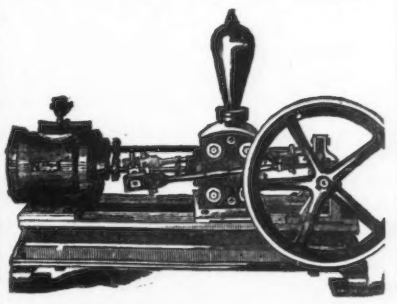

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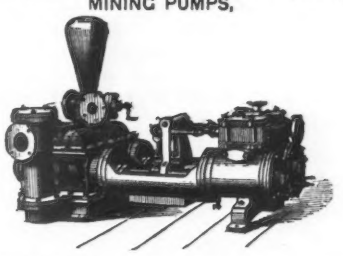

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Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natura ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
Gases, (carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
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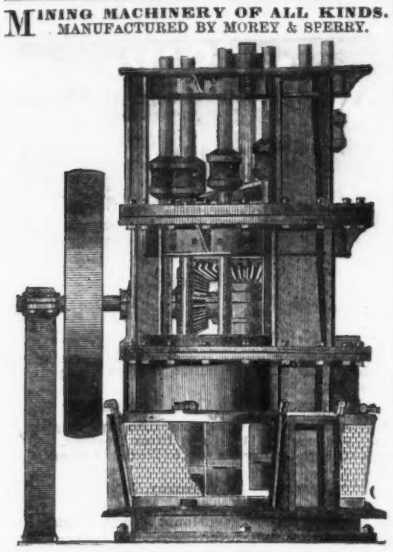

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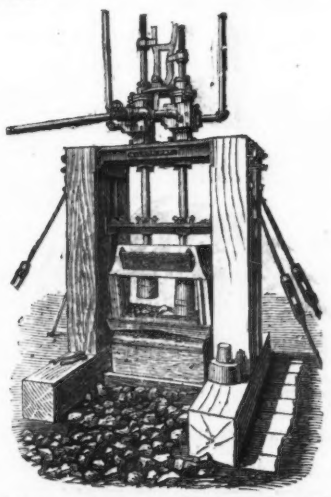

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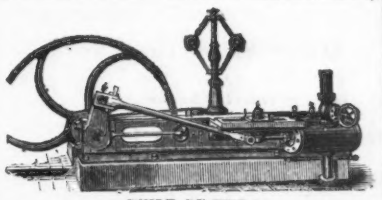

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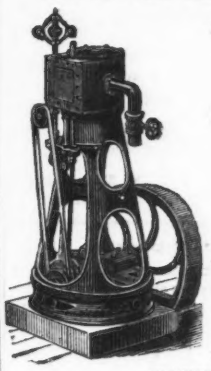

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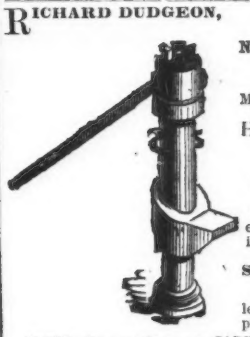

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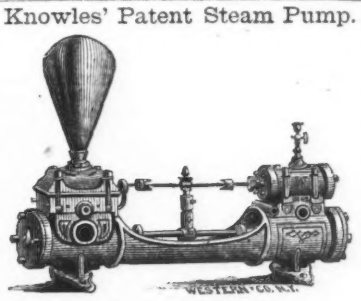

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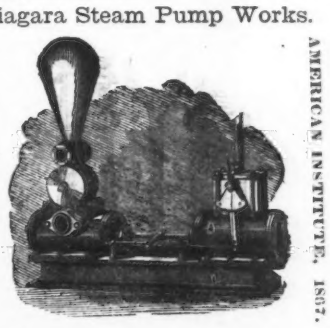

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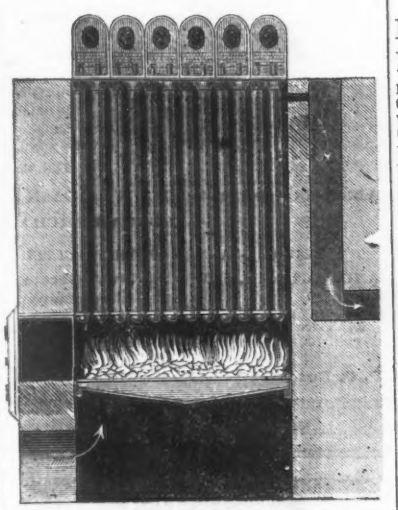

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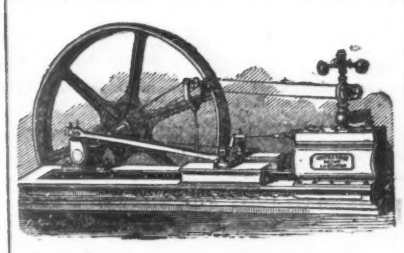

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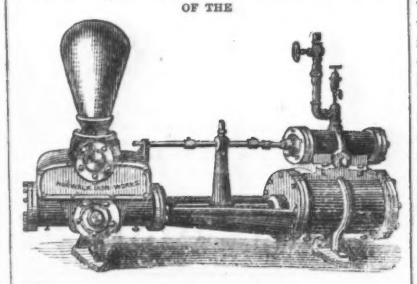

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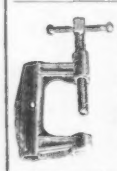

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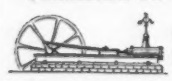

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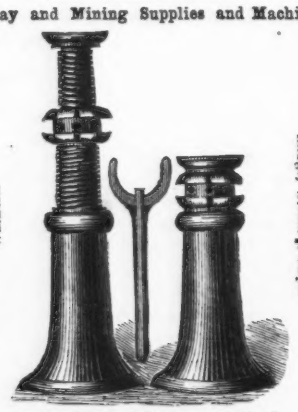

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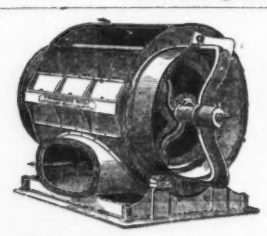

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